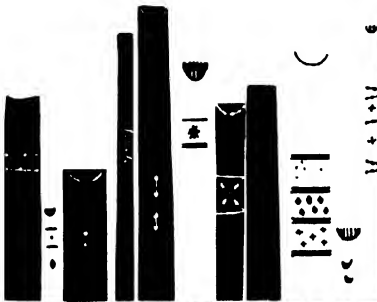




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In Twelve Volumes

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Volume Three

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THE WORLD BOOK
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THE WORLD BOOK

MODERN ENCYCLOPEDIA PICTORIAL

VOLUME COMPREHENSIVE THREE

CHALK, a soft, granular variety of limestone, consisting chiefly of the skeletons of minute animals that lived in shallow seas ages ago. When seen through the microscope, a piece of chalk shows hundreds of these tiny shells of different forms and sizes. Some resemble snail shells; others are circular and beautifully marked. There may also be present needlelike objects which came from sponges. Chalk is almost wholly carbonate of lime, with traces of silica and in some cases of magnesium carbonate, ferric oxide, and alumina. It is whitish or yellowish in color. The great white cliffs in France and England, on each side of the Strait of Dover, are composed of chalk. Those on the English side were the reason for giving the name of "Albion" to England centuries ago, for *Albion* is derived from Gaelic words meaning *white* and *hill*. There are also extensive beds of chalk under the city of London. In the United States, there are minor chalk deposits in Arkansas, Texas, Iowa, and



A CHALK MASS

some other states. In geological classification, the chalk formations are characteristic of the European Cretaceous System (which see).

Though the crayons used for writing on blackboards in schools are called chalk, in America they are usually manufactured from magnesia. Chalk mixed with clay is used in the manufacture of portland cement. It is also used to make whiting. The latter enters into the preparation of rubber goods, paint, putty, silver-cleaning powders, and other products. Chalk is sometimes used as a top dressing for soils, and when purified, it is an ingredient in tooth powders. French chalk, so-called, used by tailors, is a variety of talc. See LIMESTONE.

A.J.
CHALK SYSTEM. See CRETACEOUS SYSTEM; CHALK.

CHALONS, *shah loN'*, BATTLE OF. See FIFTEEN DECISIVE BATTLES OF THE WORLD.

CHAMBERED NAUTILUS. See NAUTILUS.

CHAMBERLAIN, the family name of a father and son in English political life:

Joseph Chamberlain (1836-1914), one of the leading English statesmen of his day and frequently called the greatest Colonial Secretary England has

ever had. He began public life as a Radical; he ended it as a Unionist, exactly the opposite. Twice he deserted his political chief—once Gladstone, the Liberal, once Balfour, the Conservative—and both times his withdrawal caused the defeat of the Ministry and the division of the party of which he had previously been a member. These changes of party represented a gradual development in a statesmanship which was at first local, then national, and lastly imperial.



JOSEPH CHAMBERLAIN

For more than a generation one of the leaders in English political affairs.

As a Local Leader. Chamberlain was born on July 8, 1836, in London, where his father was a prosperous business man. At sixteen he began work in his father's office, but two years later went to Birmingham to assist in the management of a screw factory in which his father had an interest. At the age of thirty-eight, Chamberlain retired from active business with a fortune. Meanwhile, he had become prominent in the political as well as the business life of Birmingham, and in 1873 was elected mayor.

A National Figure. Chamberlain's work in Birmingham gave him a national reputation, which was recognized by his election to the House of Commons in 1876, and only four years elapsed before his ability won him a place in Gladstone's Cabinet as President of the Board of Trade. In 1886 Gladstone appointed him President of the Local Government Board, but his opposition to Gladstone's Home Rule Bill led him to resign after two months. With other Liberals who opposed this measure, he then organized the Liberal Unionist party, and succeeded in overthrowing the Ministry, but he returned to the more conservative fold in 1895, when he became Secretary of State for the Colonies in the Salisbury Cabinet. In 1888 he was one of the three delegates sent to the United States to settle the Canadian fisheries dispute, but the most important result of the visit, so far as Chamberlain himself was concerned, was his marriage to Miss Mary Endicott, the daughter of President Cleveland's Secretary of War.

"Think Imperially!" The keynote of Chamberlain's life from then until his death was expressed in this appeal to his countrymen. It was as Colonial Secretary, an office which he held for eight years, that his most important work was done. After 1895 the "economic necessities of a world-wide empire" were

his first care. He determined that the colonies, instead of being alternately neglected and exploited, should be steadily encouraged and given coöperation. It was during his term in office that the Australian colonies were united into a commonwealth.

In 1903 Chamberlain introduced tariff reform as an issue in British politics, by proposing to give the colonies a preference in trade. Balfour, as Prime Minister and leader of the party, tried to keep the tariff out of politics. Chamberlain refused to compromise, resigned from the Cabinet, and finally, in 1905, forced the issue before the people. The Liberals won a sweeping victory, which was generally interpreted as the deathblow to tariff reform. In 1906 Chamberlain's health began to fail, but he sat in Parliament until the year of his death, though his active leadership was at an end.

Sir [Joseph] Austen Chamberlain (1863-), the oldest son of Joseph Chamberlain, had already won honors before his father died. He was educated at the University of Cambridge, and entered Parliament in 1892. From 1895 to 1905, he was a member of the Balfour Ministry, in which he held the posts of Civil Lord of the Admiralty, Financial Secretary to the Treasury, Postmaster-General, and finally Chancellor of the Exchequer. After 1906, when his father retired from active leadership, Austen Chamberlain was the acknowledged champion of the tariff reformers. From 1892 until 1914, he represented East Worcestershire in Parliament, but in 1914, after the death of his father, he was elected by Birmingham West, the constituency which his father had represented for twenty-nine years.



Photo P. & A.

AUSTEN CHAMBERLAIN

In May of the next year, he became Secretary of State for India in the coalition Cabinet headed by Asquith, which the World War made necessary. In the ensuing Lloyd George Cabinet, he became Chancellor of the Exchequer, and when Bonar Law retired, he was recognized as the head of his party. In the Baldwin Conservative Ministry, succeeding the MacDonald Labor Ministry, Chamberlain was given the post of Foreign Secretary.

CHAMBERLAIN LAKE. See MAINE (Lakes and Rivers).

CHAMBER MUSIC. See MUSIC, subhead.

CHAMBER OF COMMERCE (or ASSOCIATION OF COMMERCE), an organization of traders and merchants for their mutual benefit, or for the wider purpose of promoting the business and commercial interests of their community. Membership in these local organizations is voluntary, and their usefulness depends on the energy and ability of the members. The fundamental purpose is to increase the prosperity of the community, and incidentally of its individual business interests. To this end a chamber of commerce may investigate

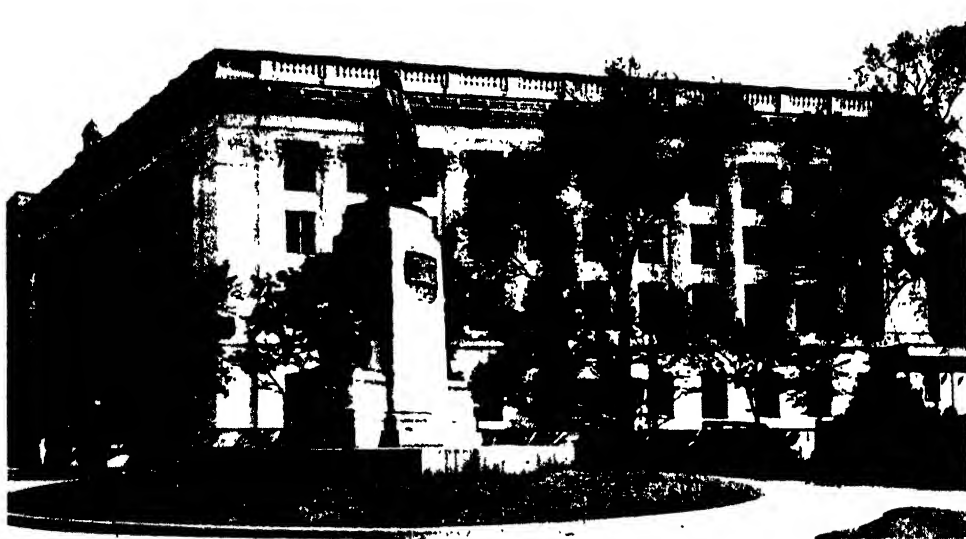
general business conditions at home and abroad, transportation facilities and their possible improvement, extension of credit, and any other business factors. The recommendations of such a body frequently influence local, state, or provincial, and occasionally even national, legislation. One of the most common activities of such chambers is the distribution of printed matter in which the advantages of the city or district are set forth to attract new industry.

CHAMBER OF COMMERCE OF THE UNITED STATES, an organization in which membership is open to local chambers of commerce and other associations of business men. It was organized at a national commercial conference called by President Taft and held in Washington, D. C., in 1912. Its purpose, roughly defined, is to do nationally what the individual chamber of commerce does locally (see CHAMBER OF COMMERCE).

It studies and encourages the organization of associations of business men, and puts the results of its investigations at the service of organizations which desire to add to their efficiency. It analyzes the statistics of commerce and production, both at home and abroad, watches dangers which might retard commercial development, and makes note of opportunities which might result in expansion. One of its objects is to keep a close watch on Congressional legislation affecting the commercial interests of the country. In a general way, it aims to do for the commercial interests of the nation what the American Federation of Labor does for labor. It should be noted, however, that the methods of the two organizations are quite different; the Federation of Labor maintains agents in Washington and operates through a central organization, whereas the Chamber of Commerce maintains no lobby and operates through its constituent members and their influence upon the members of Congress.

Unlike the chambers of commerce in France, Germany, and other European countries, the Chamber of Commerce of the United States has no official relation to the government. The government pays no part of its expenses, nor is an arbitrary tax levied for its support, as is done in some European countries. The chamber, however, acts voluntarily as an adviser, with respect to appropriations, executive orders, and legislation, and has exercised a considerable influence in the framing of paragraphs of new laws that relate directly to commercial and industrial operations.

Membership. The membership of this national Chamber of Commerce includes organizations and individual persons or firms. Every commercial or manufacturers' association, not organized for private purposes, is eligible to membership. Such associations include or-



BUILDING OF THE CHAMBER OF COMMERCE OF THE UNITED STATES, WASHINGTON, D. C.

ganizations whose membership is confined to a single trade or group of trades, and also those local or state organizations whose chief purpose is the development of the commercial and industrial interests of a community. Individual persons or firms which belong to any association already a member of the Chamber of Commerce of the United States are eligible to individual membership. The number of individual members is limited to 5,000, but there is no limit to the number of organization members. The national headquarters are at Washington, D. C., in the organization's own \$3,000,000 building, dedicated in 1925.

Control of Its Policy. One feature of the work of the Chamber of Commerce of the United States is unique—the method by which its policy is framed. The board of directors has no right to commit the chamber to any project or policy. Expression of the chamber's opinion upon any public question can be made only after a referendum has been taken and the vote of the members recorded. The right to vote is restricted to organizations; individual members are required to express their opinions through their respective local bodies. This unique procedure, never before used to obtain an expression of public opinion either in the United States or in any other country, has been found effective in convincing legislative bodies when they would not be influenced by the action of a board of directors.

CHAMBERS, ROBERT WILLIAM (1865-), a popular American novelist and writer of short stories, born in Brooklyn, N. Y. Before he began his career as an author, he studied art in

the Julien Academy at Paris, and for a time made illustrations for *Life*, *Truth*, *Vogue*, and other New York periodicals. In 1893 he published *In the Quarter*, beginning then a long and successful literary career.

Chambers has an undeniable gift for writing an interesting story, but has been criticized because of his fondness for unpleasant themes and his frank treatment of them. Many of his stories have been made into moving pictures.

Some of His Books.

Among the best known of his numerous stories are *Iole*, *The Fighting Chance*, *The Firing Line*, *Ailsa Page*, *The Common Law*, *The Business of Life*, *Athalie*, *The Girl Philippa*, *The Crimson Tide*, *The Slayer of Souls*, *Little Red Foot*, *Eris*, *The Hi-Jackers*, *The Rake and the Hussy*, *Cardigan*, *The Maid-at-Arms*, *The Man They Hanged*, *The Sun Hawk*, *The Rogue's Moon*.

CHAMBERSBURG, PA. See PENNSYLVANIA (back of map).

CHAMBLY, shaN ble'e', RIVER. See RICHELIEU RIVER.

CHAMELEON, ka me' le un, a lizard remarkable for its ability to change its color. The true chameleons comprise a family of about fifty species found most commonly in Africa,

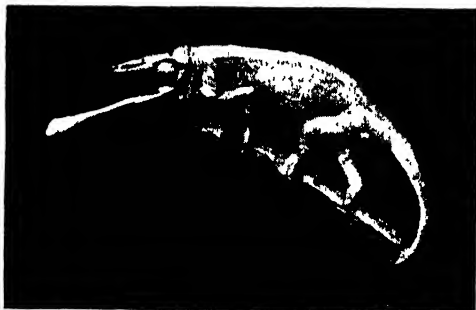


Photo: Brown Bros.

ROBERT W. CHAMBERS

but occurring also in some other parts of the Old World. They live in trees. The chameleons are awkward and slow of foot, and their habitual changes of color serve to protect them from their enemies by enabling them to lose themselves in their surroundings (see PROTECTIVE COLORATION). This power of changing color has been carefully studied. The chameleon does not arbitrarily imitate the hue of the object on which it rests, nor is the process wholly under its control. The changes are reactions to certain conditions of light and temperature and to various emotional states, such as fear and anger. The physical cause may be traced to two differently colored layers of pigment under control of the nervous system. The best known species is ordinarily a greenish-gray, from which it changes to emerald-green or to dull black, sometimes showing reddish or yellowish spots.

This lizard is six to seven inches in length, and has long, slender legs, a large head, and a long, prehensile tail. Its toes are so divided as to give all feet the power of grasping like a



A CHAMELEON

(Photographed by the Section of Photography of the Field Museum of Natural History.)

hand. Though slow and sluggish, the chameleon catches insects with lightning rapidity, having a sticky tongue which it can shoot out as much as six inches. It is also aided by its great bulging eyes, which are set in sockets in such a way as to move independently of each other. Chameleons require much water and will die without it. They have the power of inflating themselves with air, a process that

gave rise to the fable that they live on air. They are the only lizards that do not drag the body on the ground.

An American species of this name, though not related to the Old World chameleons, has the same power to change its hue. Its most common colors are brown and green. This lizard has a body not over three and a half inches long. It is more active than the true chameleons. See LIZARD. L.H.



Photo: Visual Education Service

THE CHAMOIS

Like the wild chamois from her Alpine snow,
Where hunters never climbed, secure from dread.

—HOOD: *Ode to the Moon*.

Paris. When only eight years of age, she composed sacred music that won the praise of Bizet, the composer of *Carmen*. She studied for several years under excellent teachers, began a successful career as a pianist at the age of eighteen, and became in time well known as a music conductor. Chaminade's fame, however, rests chiefly on her compositions, which include such familiar instrumental pieces as *The Scarf Dance*, *The Flatterer*, and *Morning*, and many charming, melodious songs. Among the latter are *Madrigal*, *Rosamunde*, *Berceuse*, and *The Silver Ring*. As a composer she is distinctly original, and her compositions are valuable exercises for the piano student.

CHAMOIS, *sham' mih*, a shy member of the goat antelope family, famed for its fleetness and its keenness of scent. It lives in the high mountains of Europe and Western Asia, and was once very common in the Swiss Alps. In the summer it is found near the snow line; in the winter, lower down, in the forests. It is a rather small animal, with a brownish summer coat that changes to fawn color in winter and gray in the spring. Its head is pale yellow, marked by a black band surrounding the eyes and extending from the nose to the ears. Its horns, which are about six or seven inches long, are round and almost smooth, and they grow straight upward until near the tip, where they suddenly end in a sharp hook that is bent backward. Both horns and tail are black.

During the feeding time, which is in the morning, one animal is always standing on guard in some prominent place, for the purpose of warning the rest of approaching danger. The pursuit of chamois is difficult and dangerous, as they live in the steepest, roughest mountains, and are so quick and light that they can easily jump across a ravine fifteen feet wide. Though the flesh is highly prized as food, the chief value of a chamois lies in its skin, which is used to make the very soft, warm, flexible leather known as *chamois skin*. Most of the skin now sold as such, however, comes from the skin of sheep, and it lacks the velvety softness of the genuine chamois. See ANTELOPE.

W.N.H.

Scientific Name. The chamois is a member of the family *Bovidae*, and its scientific name is *Rupicapra rupicapra*.

CHAMOMILE, OR CAMOMILE, *kam' o-mile* (same pronunciation for both), the common name of a genus of plants belonging to the composite family, some species of which have medicinal properties. The species most commonly cultivated is called *common*, or *Roman chamomile*. It is a perennial, with a slender, trailing, much-branched stem. The flowers have white rays and yellow centers. Flowers and leaves are bitter and aromatic, and are used as poultices to cure ailments such as toothache, and medicinally in the form of tea, as a tonic for the stomach. The common, troublesome, ill-smelling *mayweed*, with its small, white, yellow-centered flowers, is a related species.

B.M.D.

Scientific Names. The chamomiles belong to the family *Compositae*. Roman chamomile is *Anthemis nobilis*. The mayweed is *A. cotula*.

CHAMPAGNE, *sham pane'*, an expensive wine, first made in France, white or red, sparkling or "dry," sweet or acid. It originated in the department of Marne, in the former province of Champagne, although a similar wine is made elsewhere. A large trade in champagne made in California had been developed before the era of prohibition.

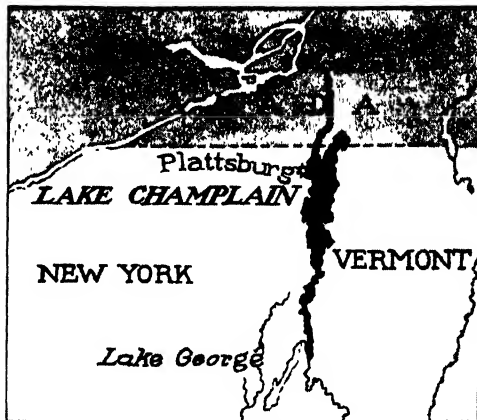
The best qualities are made almost exclusively from black grapes. The creaming or slightly sparkling champagnes are more highly valued and are higher in price than the full-frothing wines. The small quantity of alcohol which the latter contain nearly all escapes from the froth as it rises to the surface, carrying with it the fragrance and leaving the liquor nearly tasteless. The property of creaming, or frothing, possessed by these wines is due to the fact that they are partly fermented in the bottle, carbonic acid being thereby produced. Because this fermenting takes place under pressure, the bottles used must be of the strongest quality. Keeping champagne cool prevents too much frothing, and that is

one reason why it is usually served from a bucket of ice. See WINE.

CHAMPAIGN, ILL. See ILLINOIS (back of map).

CHAMP DE MARS. See PARIS, FRANCE.

CHAMPLAIN, *sham plane'*, a lake 125 miles long and from one to fifteen miles wide, lying between the states of New York and Vermont, with its northern end in Quebec. It covers an area of about 600 square miles, contains



LAKE CHAMPLAIN

many islands, and is a beautiful and popular summer resort. Salmon, trout, and sturgeon abound, and the lake is navigated by large excursion steamers. In 1929 a bridge spanning the lake was opened between Crown Point, N. Y., and Chimney Point, Vt., shortening the traveler's road between the states.

Battle of Lake Champlain. On September 11, 1814, a naval engagement was fought between British and United States vessels in the harbor of Plattsburg, on Lake Champlain. The forces were almost evenly balanced, any superiority existing being on the side of the British. After severe fighting and heavy losses on both sides, the British were defeated.

CHAMPLAIN, SAMUEL DE (1567-1635). This French explorer and colonial pioneer, the founder of Quebec, was known in history as the "Father of New France." He was the real creator of the French dominion in America. Parkman, the great historian of the French in America, sketches him in these words:

Of the pioneers of the North American forests, his name stands foremost on the list. It was he who struck the deepest and boldest strokes into the heart of their pristine barbarism. His character belonged partly to the past, partly to the present. The *preux chevalier*, the crusader, the romance-loving explorer, the curious knowledge-seeking traveler, the practical navigator, all found their share in him.

Champlain was born in Brouage, a little town on the Bay of Biscay. His father, a ship

captain, taught him the principles of navigation, but the boy entered the army. His seaman's training stood him in good stead, however, in 1599, when he was offered the command of one of several vessels about to sail to the West Indies. During the next two years he visited all the principal ports of Mexico and the West Indies, and even traveled inland to Mexico City. His account of this voyage, which brought him to the notice of King Henry IV of France, is noteworthy for one of the earliest suggestions, if not the first, for a canal across the Isthmus of Panama.



Photo. Brown Bros.

CHAMPLAIN

Who laid the foundations for a vast French domain in America.

Champlain went to Canada in 1603, exploring the Saint Lawrence River as far as the Lachine Rapids. In following years he returned, accompanied by his patron, the Sieur de Monts; they cruised along the New England coast to Cape Cod and founded Port Royal (Annapolis, Nova Scotia). This was unsuccessful, however, and with De Monts' permission, Champlain in 1608 established Quebec, which he gave its present name. On his previous explorations he had maintained friendly relations with the Algonquin and the Huron Indians, and joined them in a successful raid against the Iroquois in 1609. In this expedition he discovered the beautiful lake which has since borne his name. Champlain's help at this time won for the French the lasting friendship of the Algonquins, but also the hatred of the Iroquois, who were forced to make friends first with the Dutch and then with the English.

After this exciting adventure, Champlain returned to France to tell his story and secure further aid. From then until 1629 he crossed the Atlantic every year. He was lieutenant

governor of the colony, but more than that, he was the very life of New France. Yet he was not able to strengthen and protect Quebec as much as was necessary, and in 1629 was compelled to surrender his settlement to an English fleet. Taken a prisoner to England, he was soon released, and after Canada was restored to France, in 1632, he returned to Quebec as lieutenant governor. He died on Christmas day, 1635. See MONTS, SIEUR DE; CANADA (History); QUEBEC, the city.

CHAMPLAINIAN, *sham pla' ni an*. See ORDOVICIAN PERIOD.

CHAMPLEVÉ, *shamp leh va'*. See ENAMEL.

CHAMPOLLION, FRANÇOIS. See GLYPHICS.

CHAMPS ÉLYSÉES, *shahN za le za'*, a Paris boulevard, one of the most beautiful in Europe, extending from the Place de la Concorde to the Place de l'Etoile. It is nearly 300 feet wide, double the width of most American boulevards, and 1½ miles in length. At the end near the Place de l'Etoile is the famous Arc de Triomphe, erected to celebrate the victories of Napoleon (see ARCH OF TRIUMPH). The boulevard is lined with trees and beautiful buildings. There are many cafés, before which those Frenchmen known as *boulevardiers* love to sit and partake of refreshments while watching the passing stream of vehicles and pedestrians. See PARIS.

CHANCELLOR, *chan' sel ur*, a word meaning originally *doorkeeper*, now used to designate various important officers of the government. In Germany, for instance, the chief administrator, in England known as the Prime Minister, is called the Chancellor, Bismarck having been the first to hold the title.

In England, the *Lord High Chancellor* is not an administrative but a judicial officer, the highest in the kingdom. He is the adviser of the Crown, the Keeper of the Great Seal, the official sign of royal authority, and is the highest civil officer of the realm, below the royal family. He is a member of the Cabinet and the presiding officer of the House of Lords. His duties are very numerous, chief among them being the supreme judgeship of the Court of Chancery. He is the official guardian of all infants, as well as of people of unsound mind.

The *Chancellor of the Exchequer* is the British Minister of Finance, and a member of the Cabinet.

In the United States and Canada, the term has no official meaning, but is sometimes used instead of *president* as the title of the head of a university.

CHANCELLORSVILLE, *chan' sel urz vil*, BATTLE OF. See WAR OF SECESSION.

CHANCERY, *chan' sur ie*, COURT OF. The court of chancery was formerly the highest court of England, and second in authority



Photo. U & U

STATUE AT ORILLA, ONTARIO

only to Parliament. At present, it is a division of the High Court of Justice. It is presided over by the Lord High Chancellor, and from this circumstance it derived its name. The purpose of the court is to settle cases which do not fall under the common law. In the United States, the terms chancery and equity, court of chancery and court of equity, are practically synonymous. See **EQUITY**.

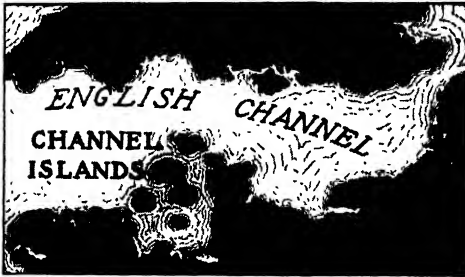
CHANDLER, ZACHARIAH. See **STATUARY HALL**.

CHANNEY, *cha' ne*, LON. See **MOVING PICTURES** (list of players).

CHANGA, *chang' gah*. See **MOLE CRICKET**.

CHANNEL BASS. See **REDFISH**.

CHANNEL ISLANDS, a group of islands in the English Channel, ten miles from the coast of France, representing all that remains to England of its once great possessions in



LOCATION MAP

France. Their combined area is seventy-five square miles. Although politically English, the islanders are typically French in manners and customs, and they pride themselves on belonging to the race which conquered England in the days of William I, the Conqueror. The islands are not bound by acts of the English Parliament unless specifically named in them. Jersey, Guernsey, Alderney, and Sark are the only inhabited islands, but there are numerous rocks and islets, many of which are submerged at high tide. The climate is mild and healthful, and flowers and vegetables are grown in great quantities, reaching the London markets several weeks before the English crops. Stone for building purposes is exported, and the islands are famous for their dairy cattle, the Jerseys, Guernseys, and Alderneys. These breeds originated here. Population, 90,000.

CHANNING, WILLIAM ELLERY (1780-1842), one of the most famous American preachers, whose influence is still felt in social and political reforms, through his memory and his writings. He was born at Newport, R. I., and studied at Harvard College. His first appointment as a pastor was in 1803, when he was placed in charge of the congregation of the Federal Street Church in Boston. At first his sermons did not show strong denominational spirit, but gradually he became a decided Unitarian

and taught the doctrines of that Church with great zeal and success. Noble and fearless, he was a strong advocate of temperance, international peace, and freedom. Cole-ridgesaid of him, "He has the love of wisdom and the wisdom of love." See **UNITARIANS**.

Worthy of Note. His most popular essays are those on *National Literature*, *John Milton*, and *Self-Culture*.

CHANSONS DE GESTE. See **FRENCH LITERATURE**.

CHANUTE, *cha-noot'*, KAN. See **KANSAS** (back of map).

CHANUTE, OCTAVE. See **AIRCRAFT** (Heavier than Air).

CHAPALLA, *chah pah' lah*, LAKE. See **MEXICO** (Waters).

CHAPARRAL, *chap a ral'*, a dense growth of rigid and often thorny shrubs or small trees that grow in poor soil on dry slopes in the Western states and Mexico. The word is derived from the Spanish *chaparro*, meaning *evergreen oak*, and was first used in the United States about 1846, during the Mexican War. References to chaparral occur in the writings of Bayard Taylor, Robert Louis Stevenson, Helen Hunt Jackson, Stewart Edward White, and others who have written of the Western country. Mrs. Jackson's description of this shrubby plant in her *Glimpses of Three Coasts* is often quoted:

Nobody will ever, by pencil or brush or pen, fairly render the beauty of the mysterious, undefined, undefinable chaparral.

G M.S.

CHAPARRAL COCK. See **ROAD RUNNER**.

CHAPLAIN, *chap' lin*, a clergyman attached to an army or navy, or to any non-religious group, performing the duties a minister performs for his congregation.

United States army chaplains are appointed by the President, with the advice and consent of the Senate, the Secretary of War making assignments and transfers. There are no restrictions as to denomination; all churches are represented. Each regiment of cavalry, infantry, and field artillery has its chaplain; one is assigned to the corps of engineers and to the Military Academy, and there is a specified number, varying from time to time, for the coast artillery corps. The number allowed to the navy bears a definite relation to the total membership in the navy and marine corps.

The rank, pay, and allowances of a chaplain in the United States army, after seven years'



Photo. Brown Bros.

WILLIAM E. CHANNING

service, are those of a captain of infantry; until then his grade is that of a first lieutenant. Unusual ability is recognized by advancement to the rank of major, though there may be among the chaplains no more than fifteen majors at any one time. A chaplain in the navy begins as an acting chaplain, with the rank of junior-grade lieutenant, and after three years becomes chaplain, progressing through the various grades of lieutenant, lieutenant commander, commander, and captain. See RANK IN ARMY AND NAVY; PRISON.

CHAPLIN, CHARLES. See MOVING PICTURES (list of players).

CHAPMAN, GEORGE (1557 or 1559-1634), the poet and dramatist of Shakespeare's day who is remembered chiefly as having been the first to translate into English verse Homer's immortal epics, the *Iliad* and the *Odyssey*. Such critics as Pope, Lamb, and Coleridge greatly admired these translations for their lofty language and swiftness of action; and they inspired one of the finest sonnets Keats ever wrote—*On First Looking into Chapman's Homer*—in which occur these oft-quoted lines:

Of one wide expanse had I been told
That deep-browed Homer ruled as his demesne;
Yet did I never breathe its pure serene
Till I heard Chapman speak out loud and bold:
Then felt I like some watcher of the skies
When a new planet swims into his ken.

Chapman was born near the town of Hitchin, in Hertfordshire, and learned his Greek at Oxford. When he was about thirty-five he published his first long poem, *The Shadow of Night*, and in 1598 his first play, a comedy, which bore the quaint title of *The Blinde Beggar of Alexandria, Most Pleasantly Discoursing His Variable Humours*. The *Iliad* and *Odyssey* translations were published in instalments, appearing at intervals throughout a period of nearly twenty years. It was not until 1611 that the entire twenty-four books of the *Iliad* were completed, and not until 1616 that the *Odyssey* was published in its entirety.

All this time, however, Chapman was writing successful plays, among the most popular being the comedies of *Al Fools*, *The Widow's Tears*, and *Monsieur d'Olive*, and the tragedy of *Bussy d'Ambois*. A play called *Eastward Hoe*, written by Chapman in collaboration with Ben Jonson and John Marston, led the Stuart king, James I, to send him to prison because of a satirical remark about the Scotch, and the play was ordered reprinted with the offending passage omitted. As a writer for the stage, however, Chapman did not equal the other dramatists of the Elizabethan period, either in his handling of plot or of character.

[He also wrote a number of long poems, made some translations from Latin literature, and completed the paraphrase called *Hero and Leander* which Christopher Marlowe had begun and left unfinished at his death.]

CHAPTER HOUSE. See FRATERNITY.

CHAPULTEPEC, *chah pool' te pek*, BATTLE OF. See MEXICAN WAR.

CHARACTER TRAINING. An eighth-grade boy who had been guilty of persistent pilfering in the school garden went to this same garden one morning to pick his own carefully tended watermelon and found that it had disappeared during the night. Thereafter he took a very different attitude toward theft. He had been stealing repeatedly without the slightest compunction; but the minute he found himself the victim of another's disregard of property rights, a new light dawned on his mind. He went to his principal, voluntarily confessed the wrongs he had committed, and promised there should be no repetition—a promise which he faithfully kept. "I never knew before how it felt to lose a thing you had worked for," was the explanation he gave of his change of heart.

The Golden Rule. "Put yourself in the other fellow's place." This is the essence of right doing; he who can do this completely will no more wrong another than he will cut off his right arm. He will tell the truth to his neighbor because his neighbor wants and needs the facts, because human society cannot exist without mutual confidence, because by his example he inevitably does something either to increase or decrease the amount of truthfulness in the world. He will keep his word and refuse to defraud or steal in any form, for the same reasons. He will be charitable in his judgments and as conscientious about injuring other people's reputations as he wishes them to be about his own. He will control his temper, will be helpful in his personal relations and generous to those whom he can help with his time, his energy, or his money. In short, he will follow the Golden Rule. To develop this power to put self in the place of others, or rather to produce a character which will act in this spirit, is the aim of moral education.

Unselfishness is Fundamental. This capacity to realize how other people feel is distributed through the race in very unequal degrees; but some germs of it will be found in every human being. It arises spontaneously in every home worthy of the name; but it extends far beyond these narrow limits. One evidence for this statement is the fact that it seldom fails to appear in a crisis. After the sinking of the *Titanic*, Mr. George Kennan, the celebrated traveler and authority on Russian affairs, wrote a letter to the *Outlook*, a part of which reads as follows:

The courage and unselfishness shown by an overwhelming majority of the passengers on the ill-fated steamship *Titanic* have recalled to my mind the remarkable exhibition of the same heroic and generous characteristics by the citizens of San Francisco during the great earthquake and fire of 1906. I did not my-

self reach the city until some weeks after the disaster, but the remembrance of the events of that period of strain and suffering was still fresh in the mind of every observer or participant, and I was greatly impressed by the enthusiasm and deep feeling shown by everybody in speaking of the behavior of the population. One friend of mine in Oakland, a man not at all inclined to be "gushing" or effusive in speech, said to me: "I am glad that I lived to see the things that happened in the first ten days after that great catastrophe. Those days were the best and most inspiring part of my life. Religious people talk about the 'kingdom of heaven,' but few of them expect to live long enough to see it realized on earth. I saw something that very nearly approached it in San Francisco, Berkeley, and Oakland in the week that followed the fire. Cowardice, selfishness, greed, and all the baser emotions and impulses of human character practically disappeared in the tremendous strain of that experience, and courage, fortitude, sympathy, generosity, and unbounded self-sacrifice took their place. Men became, and for a short time continued to be, all that we may suppose their Creator intended them to be, and it was a splendid and inspiring thing to witness. We imagine that we live in a selfish and materialistic age, and perhaps we do; but I know now of what human nature—humanity as a whole—is capable, and I can never again take a pessimistic view of the world's future."

These crises arouse men out of their habitual moral sluggishness, because they force them to realize what deprivation and suffering mean, but they could not act unless there were something to move them to action. This something we call altruism. It consists in direct regard for the good of others. It is present in great or less degree not merely in the ordinary men and women about us, but, however hidden, even in the worst criminals.

A man by the name of Schunicht murdered a young woman in the most brutal manner and with an indifference absolutely revolting. He had already left the apartment when it occurred to him that the body might remain undiscovered for weeks, and in that event, the canary belonging to the murdered woman would starve to death. Thereupon Schunicht retraced his steps, scattered enough food upon the floor of the cage to last the bird for several days, and opened the cage-door and the window in the adjoining room so that in any event the bird could make its escape. (Lombroso)

In returning to the apartment where lay the dead body of the murdered woman, this brutal criminal risked his life in order to save a canary from starvation.

Social Advancement Depends upon Character. Progress depends largely upon the utilization of hitherto unused forces. Thus, our machinery is driven by coal and oil, which lay in the ground untouched for countless centuries. When we know more about the human mind than we do now, we shall be able in like manner to tap the half-sealed fountains of moral energy, and thereby transform society more completely than it has been transformed during the past one hundred and fifty years by steam

and electricity. We are still a long distance from this goal, but while we cannot yet accomplish all we could wish, we can nevertheless do a great deal. And we are bound to put our best efforts into the attempt. Our children's own highest and permanent welfare demands it, while the society of which we are members could no more exist without character than the particles of matter which form our earth could hold together without gravitation.

Value of the Imagination. From time to time great educators appear who know how to exercise an almost unbounded influence upon their pupils. Such was the most famous of English headmasters, Thomas Arnold of Rugby; such a man was and is our own William George, of the Junior Republic. Their successes will be ours if we can catch their spirit and learn and apply their methods.

From what has been said, it will be obvious that our first task must be to develop in our children the power to realize the feelings of others. This power we may call the imagination. The imagination is developed by using it, like any other form of ability. Consequently, what we must do is to supply our children with opportunities and incentives to put themselves in the place of other people and help them to do so successfully. A child, for example, misjudges his mother. The father can often help him see why the mother is timid about his swimming, why she spoke crossly to him this morning, why she made him stay in the house and help her last Saturday when he wanted to go out and play with the boys. And if no complete justification can be found for her hasty temper, he can call attention to other traits in her character and thus help him to a proper perspective. In all this he has not merely helped the boy to understand and appreciate his mother; he has trained his powers of insight into other persons' lives. The mother, of course, can do the same for the father and for the sisters and brothers. If she will take a little trouble, she can perform the same service for those of his playmates whom he teases or bullies.

A ten-year-old school boy was afflicted with pathological fears, and in consequence was very "queer" in his actions. His classmates made his school day, as far as in them lay, one long horror, and were rapidly strengthening the hold of the disease upon his nervous system. Thereupon, the able woman in charge of mental hygiene in the school told the entire story to the four leading boys of his class, and they passed it on to the others. In consequence, they all changed from enemies to helpful friends. Now, two years after this event, the boy is perfectly normal, while his classmates have risen to a distinctly higher level of thoughtfulness and consideration for others.

Often pupils harass their teacher, and the parents, instead of trying to get the teacher's point of view and revealing it to the children, amuse themselves by tacit encouragement. To help the child to observe and reflect upon what goes on behind the mask which men wear, to see things somewhat as the wearer himself sees them, to feel something of what he feels—this is one of the first steps in the moral education of children after they have reached school age. If the revelation is sometimes painful, it will not injure the child. On the contrary, the habit of thinking concretely about others will quicken his intelligence immensely, give him new interests, make certain of his school studies, such as history and literature, far more real, and render him eager to play his part in the life of the family and in the little community of boys and girls of which he is a member, instead of being a complainer or a shirk.

In this work of developing the imagination, the right kind of books will be of very great assistance. The child should, therefore, be supplied with good stories, that is, those which represent life in concrete, vivid fashion. This condition, to be sure, excludes most of those of the current weekly and monthly periodicals, but there are plenty of others. Biographies are likely to offer more satisfactory material. One of the best for children of grade-school age is Miss Nicolay's *Life of Lincoln*; while for high-school children there is James Morgan's *Abraham Lincoln, the Boy and the Man*. This may profitably be followed by Booker T. Washington's *Up from Slavery*, a very interesting story, well told, which is calculated as are few others to develop the power of seeing and realizing how the other half of the world feels and lives. The effect of contact with such characters will ordinarily be greatly increased if the parents read these records of life with their children and discuss with them some of the issues which they raise.

Thoughtfulness is Important. More often than not, the wrong we do others and the good we fail to do are the results of sheer ignorance and thoughtlessness on our part. No one can realize what he does not even think of. Moral education therefore involves training our children to trace out the effects of their actions, the effects upon their happiness and upon those of others, the effect upon their own character and that of others; the indirect, and often widely diffused effects, as well as the direct and obvious ones. For example, what are the effects of giving way to bad temper? Our biting words hurt our immediate victim, the object of our wrath. Well, that is precisely what we want. But there are other consequences: his temporary or permanent enmity; if he is someone who loves us, a slight and yet perhaps permanent cooling of that love. There

are two great foes of friendship and love, in fact, of everything that binds men together in our too often lonely lives; one of these is selfishness, the other is bad temper. The effect upon our character of each outbreak of our temper is to make such outbreaks more difficult to control; we are strengthening a habit as dangerous in its own way as drunkenness. The effects of anger frequently do not cease with hurt feelings on the part of the victim; for example, if he is my brother, our mother will suffer also. Generally, anger, in tending to produce ill-will and a sense of injustice on the part of its victim, tends to make him bitter in his turn; tends not merely to arouse his ill-will against us, but also does its part to make him feel sour toward the world and thus tends to eat away the foundations of his good will toward his fellow men. These bare suggestions as to the results which may follow a single failure in self-control are only the beginnings of an all but limitless subject. The parent must not tell these things to the child. He must by questions and suggestions help the child to discover them for himself.

There is a certain effect upon self resulting from the control of bad temper and similar feelings which must never be overlooked—the joy of feeling your own moral fiber as a consequence of your conquest of your impulses. The admiration for power is at the basis of all the worship of athletes. Every boy desires, at some period of his life, to be an athlete. But there are other fields besides the gridiron where a good fight is demanded and strength is at a premium, and with the consciousness of strength goes the glow of victory.

We may train our children in thoughtfulness, furthermore, by helping them to discover and work out possible modes of helpfulness—for example, methods by which an overworked mother may be saved weary steps, methods by which some lonely classmate's life may be made a bit more happy, methods by which dishonest practices in school athletics, in class politics, in the care of the money of school organizations, and in class work, may be broken up. In sum, then, we must seek to develop in our children (1) what Thomas Arnold called "moral thoughtfulness," or the power and the habit of observing and reflecting upon conduct, our own and others', so that we shall be aware of the effects of what they are doing; (2) we must develop the power, as far as possible, of realizing these effects.

Doing Is As Essential As Feeling. Finally, we must not allow their interests and good intentions to evaporate, or we shall have on our hands the most hopeless specimen of the human race—a sentimentalist. This means a being who knows what to do and feels great enthusiasm about doing it, but never actually

does it. To avoid this fatality, we must see to it that knowing and feeling are followed by doing. It must be admitted, however, that this is largely a matter in the child's own hands, not ours. Much muddled thinking goes on about forming habits in other persons. I can create in my child a habit of keeping his room in order or getting to school on time by threatening him with punishment in case he fails. I can do the same thing for honesty and veracity, at least in his relations with me and perhaps with his teacher. But in all this I am simply developing a habit not of seeing and realizing the importance of truth-telling so that he is willing to suffer loss in order to be truthful, but simply the habit of being afraid of punishment. If that is all there is to it, when he gets out from the confines of the home he will usually drop the habit the minute he has turned his back on the door.

All I can do for him in this particular phase of his moral life, then, is to protect him as far as possible from temptations clearly too strong for him to resist, surround him with opportunities to do the right thing where he is likely to rise to them, and counsel and encourage him as best I can when he hesitates or is in doubt. This is not quite all, however. When I punish him for wrong doing, I may merely make him more wary about being caught the next time. But if I punish him, not in anger, but because I know, and he will sometimes see, its justice, I may accomplish something far more important. I may make him appreciate the seriousness of the wrong he has committed. He has inflicted a harm on someone else. He would not have done so had he realized how the other would feel under the blow. Punishment, wisely administered, may open his eyes as to how it feels to suffer; the evil he has inflicted upon others may come home to him, and this experience may create genuine repentance and with it a permanent change of attitude.

Duties Owed to Others. We have obligations to individuals, such as members of our family, our neighbors, our employers; we have, in addition, public obligations, as to our native city, our country. A sense of these duties is harder to develop than a sense of the former class. It can, perhaps, best be produced by developing in the mind a vivid, concrete picture of the difference between a well-conducted and an ill-conducted society; for example, between a community, on the one hand, where all the drivers of cars habitually break every traffic rule they dare, cut in ahead of each other regardless of who has the right to the road, and run down without hesitation every passenger or every lighter car that does not keep out of the way; and a community, on the other hand, where mutual deference and regard for others' rights to the road are prac-

ticed as a matter of course. Imagine a society where there is mutual respect for rights, and mutual aid where necessary, and mutual goodwill everywhere; imagine again a society where everyone lives in constant danger of ruin through fraud or violence, where there is no chance of getting one's rights except through the courts, and no chance of getting one's rights in court except through bribery—a society, in short, where "man is a wolf to man." If the difference between two such societies is brought home to a normal child, he will wish for the first, and be willing to do his part to create and maintain it. Under proper guidance, furthermore, he may be led to discover what kind of action this involves. It means, for example, business men who are willing to say, with the late W. H. Baldwin, Jr., when he went to Fargo as agent of the Northern Pacific: "I will get freight honestly or not at all."

The Home a Character Laboratory. If such pictures are to mean anything to a child, the society which he knows best, namely, the family, must exemplify the traits which he is expected to embody in his conduct in the larger world. If the members of this smaller group exhibit good will, consideration for each other's interests, charity in their judgments of each other, willingness to help each other, evenness of temper, ability to count absolutely upon each other's loyalty in time of stress, here is the first step toward the appreciation of the value of the qualities which are to be incorporated into the life of the larger world about him; here it is that he really learns the meaning of such words as justice, loyalty, and goodwill. For no one really understands a word, or at any rate, realizes its significance, unless it represents something which he has observed or experienced.

The Idea of Progress. For the full liberation of the forces within the child which make him willing to do his part in maintaining the modes of action upon which society depends, not merely for its welfare but for its very existence, there must be a belief that this society is capable not merely of being preserved at its present level, but of rising to higher levels than it has yet attained. The best preparation for this view of life is an inborn spirit of hopefulness which is most intimately associated with abounding physical vigor and thus with perfect health. Another is some actual knowledge of the slow but sure progress of the race. Many history teachers know nothing of these things; they know only names, dates, and changes in boundary lines and in dynasties. Therefore, the parent ought to be prepared to attend to this matter himself. He may, for instance, read with the child such historical books as Breasted's *Ancient Times*. Another suggestion: a study of the men of the Stone

Age is likely to be especially attractive to twelve-year-old children and may leave upon their young minds an indelible impression of the distance which man has traveled on the road toward a worthy civilization, and may thus implant a fixed belief in the power of mankind to go the rest of the way.

Team Work. The child, like the adult, must feel also that he has and has had co-workers in this field. The marvelous examples of devotion which are strewn through the records of every great war are due in part to the feeling of each soldier that he is only doing what countless comrades are doing, and to the consequent determination that where everyone else is contributing his part, he himself will not play the shirk. The victories of peace and the devotion to duty which peace demands even more insistently, though not so loudly as war, require, in like manner, a sense of the solidarity of human effort. We often fail to find it even where it is present. It is necessary, therefore, to become acquainted as intimately as possible with some of those who have been leaders in this great work of bringing civilization to, and preserving its benefits for, a world descended from roving bands of naked savages. Here again we may get much through biography and sometimes from history; also, an appreciation of the work of our contemporaries from certain journals and magazines.

One aspect of our relation to society our children should never be allowed to miss is the fact that every unprincipled man is a parasite or a sponge. He defrauds, for example, by taking advantage of the confidence between man and man, built up by millions of honest and kind acts; or he takes advantage of forms of helpfulness that have grown up on the supposition that they will not be misused, whether it be a lift on the road or the liberty to use a book in a school library paid for by the taxpayers.

Our Social Inheritance. The fact is that almost everything we have which is worth having we owe to others, and very much of it to their devotion, their public spirit, and often to their courage. The right of *habeas corpus* (which see), which protects us from arbitrary imprisonment; freedom of conscience; representative government and democratic institutions in general; our own national independence; the unity of our country; our system of free schools—all these were toiled for with unbounded efforts, and most of them were fought for at the risk of property and life. All these advantages the sponge greedily appropriates, and does not even do his part toward keeping them going. Such persons need to be shown that the first principle of a gentleman's code of honor is to row your own weight, and that of all the various types of men, the parasite is the most disgusting.

Character in Spirit of Action. What we have to do in character education is not to attempt to create a lot of isolated qualities such as obedience, truthfulness, honesty, and charity of judgment, as we attempt to teach a dog a lot of unrelated tricks. All virtues are the expressions under varying conditions of a single spirit. Accordingly, what we have to do as parents and teachers is, as far as in us lies, to awaken this spirit where it sleeps, to make it more fully alive, to strengthen it where it already exists, and to render it as farseeing, as consistent, and as intelligent as we possibly can. A man who has money in his pocket can use it to buy a great variety of goods and services. Similarly, he who has the altruistic spirit possesses that which will enable him to assume the right relations in the home, on the playground, in the school, in his associations with his neighbors, with his customers, with his competitors, and in his capacity as a citizen, both of his native country and the world. F.C.S.

Related Subjects. Parents who desire to explore further into the problems confronting them in rearing children are referred in these volumes to the following allied articles

Anger in Childhood
Childhood, Behavior in
Dishonesty in Children
Habits in Childhood, Trouble-some
Heredity (Inheritance of Intellectual and Moral Traits)
Mental Conflict, a Cause of Misconduct

CHARADE, *sha rade'*, a popular form of riddle, the answer to which is a word of several syllables, each of which alone is in itself a word. Each syllable, taken as a word, is described, and finally a puzzling definition of the whole word is given. The following is an example: "Someone threw my first and second at me, and it hit my third. It did not hurt me, for it was only a branch of my whole." The answer is *Mistletoe*.

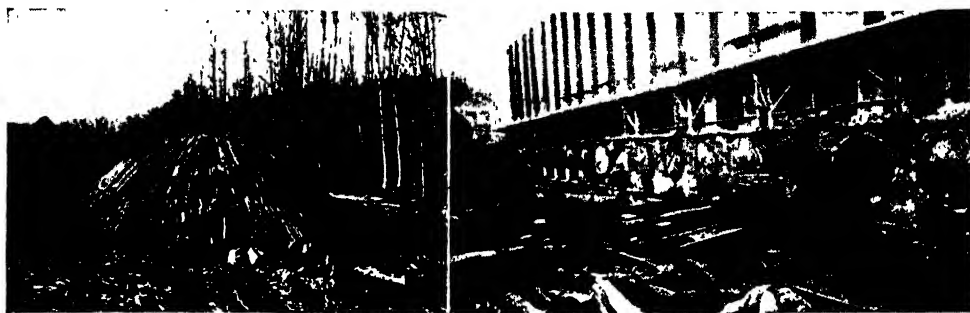
A pleasing charade requiring more thought is in the form of a rhyme, as—

My first is a circle, my second a cross;
If you meet with my whole, look out for a toss.

The answer is *Ox*. Charades may be presented in tableau form, that is, by persons in positions suggesting the word. A girl sitting under a high table would suggest the word *misunderstand*. When charades are presented in the form of little plays, each syllable represents a scene; they are then called *acting* charades. This form of amusement is much in vogue on social occasions, especially with children.

Derivation. It is thought that the word comes from the French word *charade*, meaning *idle talk*, which in turn was derived from the Spanish *charrada* and *charro*, meaning *speech and actions of a clown*.

CHARCOAL is the familiar brittle, coal-like material produced when wood burns incompletely, and hence often found in the ashes of a wood fire. Wood consists chiefly



OLD AND NEW METHODS OF PRODUCTION

Photo, Visual Education Service

An old-time pit, stacked for burning; a group of modern retorts, from which black oak is being pulled.

of carbon, hydrogen, and oxygen. Charcoal was formerly made in large quantities by cutting down trees, piling the logs into mounds or pyramids, covering these with earth, and setting the wood on fire. The earth restricted the draught, or supply of air, to the fire, and thus kept the wood from burning completely to ashes. In countries where hardwood is plentiful, charcoal is still made in ways similar to that described. Sometimes the heating is carried out in closed iron retorts, and the escaping gases are cooled so as to condense the acetic acid, wood alcohol, and acetone which they contain.

Although *hardwood charcoal* is the most common variety, almost any plant or animal material can be charred.

Commercial charcoal is carbon mixed with the impurities which remain as ashes when the charcoal is burned. After wood charcoal, the next most common commercial varieties are *lampblack*, and *animal charcoal*, or *boneblack*. Boneblack is made by charring bones; lampblack, by burning oil and letting its yellow flame strike against a cold metal cylinder which turns slowly so that it will not become overheated in any one part. See BONEBLACK.

Uses of Charcoal. Wood charcoal is used as a fuel, and to produce a smokeless fire. It was formerly the only fuel used in the smelting of iron ores, but for this purpose it has been almost completely replaced by coke, a form of carbon made from coal in much the same way as charcoal is made from wood. Large quantities are still used in the old-fashioned black gunpowder, which is a mixture of charcoal, sulphur, and saltpeter. For military purposes this kind of gunpowder has now been largely replaced by other explosives, which have the double advantage of being much more powerful and of yielding little or no smoke. Charcoal gunpowder, however, is cheaper than these smokeless powders, and is therefore commonly used in blasting rocks, in clearing land of tree stumps, and in loosening soil in some places, so that the roots of trees and plants can grow to greater depths than would otherwise be possible.

Charcoal has the property of absorbing large quantities of gases. Boxwood charcoal will absorb ninety times its own volume of ammonia gas, and coconut charcoal 170 times its own volume. Charcoal is sometimes used to sweeten the air of rooms. Lampblack is much used in paints and in printing and drawing inks. Carbon inks, such as India ink and printing inks, do not fade like ordinary writing inks. Animal charcoal is largely used in the sugar refinery and in the distillery. Black as it is, it has the power of removing the color from crude sugar, syrups, and crude liquors, leaving them as clear and colorless as water. See ABSORPTION; COAL.

Derivation. The origin of the word *char* is doubtful, but some authorities derive it from the Anglo-Saxon *cearcian*, meaning to *crackle*.

CHARD, SWISS CHARD, or SEA KALE, a valuable but not extensively cultivated vegetable. It is a form of common garden beet, but its roots are small and woody. The central rib of the leaf and the enlarged stalk are prepared for the table in much the same way as asparagus, and the succulent leaves themselves are cooked as greens or used as a salad. Swiss chard is cultivated in about the same manner as the garden beet, and deserves a place in the home garden, for a continuous supply of greens may be had all summer by means of succes-



SWISS CHARD

sive leaf cuttings and thinnings. Like other leafy vegetables, chard is valuable for its mineral salts and vitamins. See BEET. B.M.D.

CHARGÉ D'AFFAIRES, *shahr zha' da-fair'*, a French phrase meaning *charged with affairs*, now used generally to indicate a diplomatic agent of inferior rank sent by one country to another. He takes rank after ambassadors, ministers, and resident ministers, and is given his credentials not by the ruler of his state but by the minister of foreign affairs. Nor is he accredited to the ruler of the state to which he goes, but to the minister of foreign affairs. When two nations are on the verge of a break and ambassadors and ministers have been withdrawn, special *chargés d'affaires* may be appointed to carry on the necessary communication. At any time that an ambassador is absent from his post, a member of his staff is made *chargé d'affaires*. See DIPLOMACY.

CHARGE OF THE LIGHT BRIGADE, a stirring, patriotic poem by Alfred Tennyson, written to celebrate the memory of the English brigade of light cavalry whose heroic charge against the Russian center, in the Battle of Balaklava, has won it undying fame. This battle, one of the most important engagements of the Crimean War (see CRIMEA), was fought on October 25, 1854, with the Turkish, French, and English forces contending against the Russians. Through a mistake in issuing orders, the English cavalry brigade under Lord Cardigan, numbering about 600 men, was commanded to charge the Russian guns at the end of a long valley. Though they knew "someone had blundered," they rode to the attack at the word of command, while, in the language of the poet—

Cannon to right of them,
Cannon to left of them,
Cannon in front of them
Volley'd and thunder'd.

Storm'd at with shot and shell,
Boldly they rode and well,
Into the jaws of Death,
Into the mouth of Hell
Rode the six hundred.

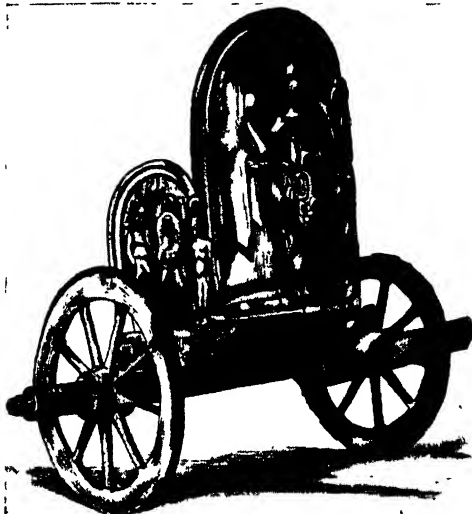
Only a remnant of the brave company returned from the ride into the "jaws of Death." A French officer who witnessed the charge said, "It is magnificent, but it is not war." Yet that splendid example of devotion to duty has been an inspiration to the world through all the years that have passed, and whoever reads the story of the "Charge of the Light Brigade" feels as Tennyson did when he wrote the closing words of the poem:

When can their glory fade?
O the wild charge they made!
All the world wonder'd.
Honor the charge they made!
Honor the Light Brigade,
Noble six hundred.

Related Subjects. For additional information on the historical setting, see the articles BALAKLAVA; CRIMEA (Crimean War).

CHARING CROSS. See LONDON (England).

CHARIOT, the original of all modern wheeled vehicles. The chariot of ancient times had two wheels surmounted by a boxlike body in which the driver stood, and was probably first used in war. Two or four horses were used, and in many cases the axles of the wheels were



Arms on armour clashing bray'd
Horrible discord, and the madd'ning wheels
Of brazen chariots ray'd; dire was the noise
Of conflict —MILTON: *Paradise Lost*

armed with scythelike blades with which to mow down the ranks of the enemy. The ancient Britons used chariots both in war and for state occasions, and the conquering Romans took back home with them many of these vehicles and used them in their triumphal processions. Egyptians, Assyrians, Greeks, and Romans vied with each other in the magnificence of their chariots, which were built for display and effectiveness and not for speed.

The reins of the harness were sufficiently long to be tied round the waist of the driver, leaving his hands free for the use of weapons. The wheels had four, sometimes eight, spokes, and were cumbersome and heavy. Many noted groups of statuary exist which depict a chariot drawn by two horses urged on at full speed by a warrior whose spear and quiver of arrows are ready to his hand. In olden days, chariot races were common; what is regarded as the finest description of such an event is found in Lew Wallace's historical novel *Ben Hur*.

Derivation. The word chariot is derived from the Latin *carrus*, from which also descend the words *car* and *carriage*.

CHARIOTEER, a name applied to the constellation Auriga (which see). See also, PHAETHON; MYTHOLOGY (The Story of Phaethon); ASTRONOMY.

CHARIS. See VULCAN.

CHARITIES AND CORRECTIONS, NATIONAL CONFERENCE OF, now known as Conference of Social Work. See SOCIOLOGY.

CHARITY. In the word *charity* are summed up the acts of mercy that man performs for the relief of his fellow creatures who are suffering from poverty, sickness, or other ills. Charity is a practical working out of the doctrine of the Brotherhood of Man; it is an expression of man's love for humanity, and offers a common meeting ground for all those who find it "more blessed to give than to receive," regardless of their faith or creed. In the words of Pope (from the *Essay on Man*)—

For modes of faith let graceless zealots fight;
His can't be wrong whose life is in the right
In faith and hope the world will disagree,
But all mankind's concern is charity.

Individual charity, the kind advocated in the Biblical parable of the Good Samaritan, where a wayfarer saw another in trouble and "had compassion on him," has always existed and always will exist as long as there is suffering in the world. In modern times, however, charity has come to be especially identified with organization, and with groups of individuals who are working together for permanent and not temporary results. When charity or relief is administered in this form, the term "charity" is now generally dropped from the titles of administrative agencies and the terms "welfare" and "social work" are substituted. The primary reason for this substitution of terms is that the words "charity" and "relief" have come to signify in the minds of the poor an unfavorable distinction between themselves and their benefactors.

Regulated Charity. Relief work of an organized character had its beginning in the early Christian Church, and the churches are still active agents in the field of charity. But religious bodies being numerous and varied, more united efforts were needed for widespread success. With the realization of this fact, there developed a more universal coöperation. First came the formation of relief societies whose purpose was to do away with haphazard methods of giving and to place the work on a systematic basis. Later the idea was extended to improving permanently the condition of the poor. Relief societies now are maintained in almost countless numbers in various parts of the world, including in their work the care of destitute, neglected, and delinquent children, impoverished families—in fact, people of every description who are in need of a helping hand.

Bureaus of Charities. The final step in systematized charity was the formation of societies under various names, such as Associated Charities, United Charities, Boards and Bureaus of Charities, and, more recently, Family Welfare societies and associations. The first of these societies, and the one on which the others have been modeled, was started in London in 1869, receiving the support of such eminent men as Gladstone and Ruskin. Its founders stated that its main object was "cure, as distinguished from the mere alleviation of distress." Hardly less important was the aim to bring about such coöperation between existing relief societies as would do away with any overlapping of their fields of effort.

Societies of this character are now maintained in nearly all the larger cities of the United States, Great Britain, Canada, and Australia. Various charitable organizations similar to these are also found on the continent of Europe. The first American society was founded in Buffalo, N. Y., in 1877.

All of these societies work on certain fundamental principles. First of all, they investigate all cases that come to their attention. A record is made for each family and placed on file for reference. All possible information is obtained, and this is placed at the disposal of individuals or relief societies that are interested. In this way the charity-organization society makes possible coöperation among all the philanthropic agencies of the city.

A certain amount of personal service is conducted by voluntary workers called friendly visitors, and especially, more recently, by paid professional case workers. The purely altruistic and sympathetic motive is giving way to the more constructive philanthropy of encouraging self-help and assisting the individual to make his own adjustments.

Indeed, a new note has been sounded throughout the entire field of charities. While the older type of social service, as typified by relief societies, was directed toward the needs of the individual, the emphasis is now placed increasingly upon community reorganization and control. The work of these organizations now includes the effort to bring about certain social reforms to mitigate poverty, immorality, inefficiency, and crime by endeavoring to interest the community in establishing playgrounds, public baths, swimming pools, and comfort stations, and in improving housing conditions and sanitary conditions in general.

Social work is coming to be recognized as a profession, requiring men and women of education and high ability, and the necessity for scientific method in attacking social problems has led to the establishment of special training schools and departments in universities. Moreover, increased attention is being given to

research and a scientific study of human behavior.

The charity bureaus are supported by voluntary contributions, and are administered by boards of directors chosen from among the contributors. See SOCIOLOGY. L.L.B.

CHARITY, SISTERS OF, also written **SISTERS OF MERCY**, is the name given to a number of Orders of women in the Roman Catholic Church which are devoted to the care and education of the sick, the poor, the aged, or the orphaned. Each order is known by its special gown or habit, usually loose robes of black, relieved at the throat and about the face by a touch of white. The members of all the orders are forbidden to marry. The first organization was established in France by Saint Vincent de Paul in 1629 and was approved by the Pope, after which it spread rapidly wherever the Roman Catholic Church was found. These orders have become one of the strongest, best-known, and generally appreciated organizations within the Church. Because of their self-sacrificing lives and their systematic devotion to assisting the needy, the members have been spared persecution many times during religious conflicts. They have been saved by opposing forces when cities in which they were established were besieged and nearly destroyed. There are now a number of orders in America which are popularly known as the Sisters of Charity. G.W.M.

CHARLEMAGNE, *shahr' le mane* (742-814), the first of the Holy Roman Emperors and the only ruler of whose name *the Great* has been made a real part—for *Charlemagne* means literally *Charles the Great*. His influence on the history of Europe is hard to overestimate, for he lived just at the close of the Dark Ages, and by his enlightened measures did much to hasten the dawn of a better civilization.

He was the son of Pepin the Short and the grandson of the famous Charles Martel. On his father's death in 768, he became joint king of the Franks with his brother Carloman, but three years later Carloman died, and Charlemagne was recognized as sole king of the Franks. Desiderius, king of the Lombards, already angered because Charlemagne had married his daughter and divorced her, supported the claims of Carloman's children to their father's part of the kingdom, and against him Charlemagne undertook his first campaign. This being victoriously ended, he seized all the Lombard possessions and placed on his own head the famous Iron Crown of Lombardy. In 774, before leaving Italy, Charlemagne visited Rome and formally approved the donation of certain lands made by his father to the Pope. This is looked upon as the beginning of the Papal claims to temporal power, which caused so much disturbance in Europe throughout medieval times.

Campaigns. From this time on, his long reign was filled with wars; it is said that he made, in all, fifty-two campaigns. Lombards, Saracens, and Saxons especially were time after time forced to defend themselves against him, usually in vain. Yet despite his success, Charle-



CHARLEMAGNE

The inscription declares that "Charles the Great ruled as emperor for fourteen years"; the sword and the orb represent, respectively, his might and his divine right, while the emblems above, the eagle of Germany and the fleur-de-lis of France, indicate that his empire marked the beginning of those two great states. [The original painting of the above was by Albert Dürer; it is now in the National Museum at Nuremberg, Germany.]

magne was not a great warrior. His genius lay rather in organization, and this helped him not only to win his victories but to weld his great empire with its unrelated peoples into something approaching unity. The religious motive was often strong in his wars. For this reason, he undertook, in 777, an expedition against the Saracens in Spain, and it was on his return march that his rear guard under Roland was attacked and cut to pieces by the wild peoples of the Pyrenees in the famous Pass of Roncesvalles. He was determined, too, to establish Christianity among the Saxons, and for almost thirty years waged intermittent war against them. During the struggle, after one of numerous revolts, Charlemagne had 4,500 Saxon prisoners put to death at one time

—all in an effort to force the Saxons to become Christians. In time they yielded to these forceful methods; Saxony became a part of Charlemagne's empire, and most of the Saxon leaders of the old régime were put to death.

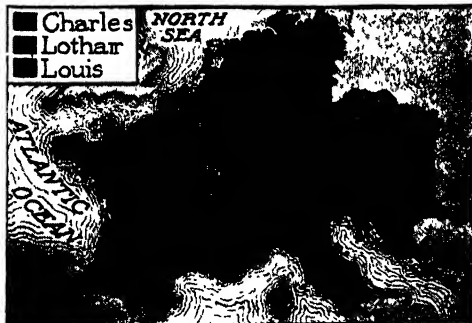
Holy Roman Empire. In 800 Pope Leo III called Charlemagne to Rome to ask his aid



Photo Visual Education Service
CORONATION OF CHARLEMAGNE

in a struggle against a hostile faction. After Charlemagne was victorious, the Pope rewarded him by placing upon his head a crown of gold and proclaiming him emperor of the Romans, the successor of Augustus and Constantine. Thus was established the Holy Roman Empire, that curious monarchy which played so large a part in the history of medieval Europe.

Importance in History. It is not only or chiefly as a conqueror that Charlemagne was an important world figure. He was as well a statesman who bound together his empire and



CHARLEMAGNE'S EMPIRE
As divided in 843.

prevented the great nobles from becoming too powerful, by employing his *missi dominici*, or officials appointed by him and responsible to him. He protected commerce, punishing se-

verely the robbers who had made perilous the life of traveling merchants, and encouraged and improved agriculture. Then, too, he was an enthusiastic patron of learning. He formed at his court a school for nobles and their sons, with Alcuin as teacher, and he himself learned to read Latin and even Greek, though he could not write legibly.

His great empire, which included not only modern France but Germany, Holland, Belgium, Switzerland, Hungary, most of Italy, and a part of Spain, was left to his son, Louis I, but the son was not as strong as the father, and the carefully built structure was in time torn apart.

Related Subjects. For additional information connected with the life and work of Charlemagne, see these articles

Charles (France)	Franks
Charles Martel	Holy Roman Empire
Crown (Iron Crown)	Pepin
Dark Ages	Roland

CHARLEROI, *shahr le roi'*, PA. See PENNSYLVANIA (back of map).

CHARLES [England], the name of two English sovereigns of the royal Scottish House of



CHARLES I

The famous triple portrait, by Van Dyck.

Stuart, both of whom were firm believers in the doctrine of the "divine right of kings." The life of the first of the two was a sacrifice to this belief.

Charles I (1600-1649), son of James I, persisted in a course of tyranny throughout his reign that ended in his execution and the establishment of the Commonwealth of England. He came to the throne of England in 1625, within the next four years he convened three Parliaments and dissolved each of them because they refused to submit to his arbitrary ways. To the famous Petition of Right, drawn up by the third Parliament, he at first agreed, but speedily violated its most important clauses by attempting to raise money by unlawful taxes and loans. Between 1629 and 1640, Charles governed England without a Parliament, using the courts of the Star Chamber and High Commission to make his various methods of raising money seem legal.

In 1639 the king's attempt to force Scotland to use English forms of worship led to a rebellion, and he was obliged to call a Parliament in order to have money voted to crush the insurrection. In 1640 the famous Long Parliament assembled (so-called because it remained in session twelve years), but Charles

succeeded no better with this assembly than with the others, and civil war began when he attempted to seize five of its leading members. The king had on his side the nobility, gentry, and clergy, while the Puritans and the people of the great trading towns supported Parliament. In the course of the struggle the "man of the hour," Oliver Cromwell, came into prominence, and his great victories at Marston Moor (1644)

and Naseby (1645) marked the ruin of the king's cause. In 1646 Charles escaped to Scotland, but was delivered up to the English Parliament. In 1649 he was tried, condemned as a public enemy of the nation, and beheaded. The private life of this unfortunate king was blameless.

Charles II (1630-1685), son of Charles I, was the first of the restored Stuart line. In 1651 he was proclaimed king by the Scotch, but his army was defeated by Cromwell at Worcester, and he fled to France. The death of Cromwell in 1658 and the popular dissatisfaction with the Commonwealth as a form of government opened the way for his return, and in 1660 he was crowned as Charles II. His first Parliament gave him all the privileges which earlier assemblies had fought to keep his father from enjoying. Among the important events of his reign were a war with the Dutch, the great plague and fire of London, the Rye House Plot, and the passage by Parliament in 1679 of the famous Habeas Corpus Act.

The court of Charles II was accounted the most immoral in all English history, and the evil life of the king and his associates was reflected in the literature of the Restoration Period.

Related Subjects. The reader is referred in these volumes to the following articles:

Commonwealth of England	Long Parliament
Cromwell, Oliver	Naseby, Battle of
Divine Right of Kings	Petition of Right
Habeas Corpus	Restoration, The
Hampden, John	Rye House Plot
	Star Chamber

CHARLES [France], the name of ten sovereigns who have worn the crown of France. The first was Charles the Bald, youngest son of Charlemagne's son Louis, who received the western portion of his father's empire when it was divided by the Treaty of Verdun in 843. The kingdom over which he ruled until 877 was the nucleus of modern France, and he is therefore known as Charles I of France.

Charles II, surnamed **THE FAT**, ruled from 885 until 887, when his subjects, wearied by his cowardly method of defending the country from the attacks of the Northmen, deposed him; Charles III soon succeeded him.



Photo Visual Education Service

CHARLES I ON HIS WAY TO EXECUTION

Charles III, called **THE SIMPLE**, came to the throne in 893. During his reign the territory later known as Normandy was ceded to the Northmen, and Lorraine was conquered. Imprisoned during a revolt of his subjects, he died in captivity in 929. Charles IV, known as **THE FAIR**, was king from 1322 to 1328, the last of the Capetian line (see **CAPETIAN DYNASTY**). His rule was marked by the strengthening of the royal power and the suppression of the lawless nobles in the kingdom.

Charles V, surnamed **THE WISE** (1337-1380), was born in the same year in which the Hundred Years' War (which see) began. When his father, John the Good, was taken captive by the English at the Battle of Poitiers, in 1356, Charles ruled in his stead and was crowned king in 1364. He fought England for several years, wresting from his enemies nearly all that they had won from his father, and was equally successful in establishing order in his own kingdom. Charles was a patron of art and literature, and laid the foundations of the National Library of France (see **BIBLIOTHÈQUE NATIONALE**). The famous prison known as the Bastille (which see) was built by him to keep the lawless citizens of Paris in order.

Charles VI (1368-1422), son of Charles V, was a boy of twelve when his father died. Four of his uncles divided the kingly power among them, and their personal ambitions soon brought the country to a state of great disorder. Finally, in 1388, Charles took the governing power into his own hands and ruled wisely until 1392. In that year he suffered from an attack of insanity, and when it became evident that his mind was permanently weakened, his uncles regained their power.

The rivalry between two of these, the Duke of Burgundy and the Duke of Orleans, split the country into two warring factions. Henry V of England, making the weakness of France serve his own purposes, invaded the country, and in 1415 won a great victory at Agincourt (which see). Five years later, the Peace of Troyes was signed, by which Charles VI acknowledged Henry V as his successor and disinherited his own son. When the king died, in 1422, nearly all of France was under the control of the English.

Charles VII (1403-1461), who succeeded his father Charles VI in 1422, fell heir to a crown that was claimed by the English for their king, Henry VI.

With nearly all of his realm in the hands of the foreign foe, the young king looked on helplessly while the English continued their conquests, and when Orleans was besieged in 1428 the outlook for France was dark indeed. In 1429 came another terrible de-



Photo Visual Education Service

CROWNING OF CHARLES VII

Behind the monarch stands Joan of Arc, the deliverer of France from the English. [Photograph from the painting by Jules Eugene Lenepveu]

feat, but in that year the deliverer of France appeared—the heroic Joan of Arc (which see). Inspired by her faith and enthusiasm, the French raised the siege of Orleans, and on July 17, 1429, Charles was crowned at Rheims. In the years that followed, the French drove the English from all their holdings in France except Calais.

As soon as Charles knew that his claim to the throne was secure, he began to reorganize the government, and in the course of time peace and prosperity returned to France. He was, however, a timid and irresolute ruler, and it is to his lasting discredit that he made no effort to save Joan of Arc from her terrible fate.

Charles VIII (1470-1498) succeeded his father, Louis XI, in 1483, when he was only thirteen years of age. For the next eight years, the kingdom was wisely governed by the boy king's sister, Anne of Beaujeu. In 1491 he married Anne, Duchess of Brittany, thereby adding the duchy to the French realm. Charles became king in fact as well as in name at the age of twenty-one, and his reign is memorable because of his invasion of Italy in 1494. This was an epoch-making event in European history,

for it was the beginning of four centuries of interference by the northern nations in the affairs of Italy. Charles accomplished the conquest of the kingdom of Naples in 1495, but a league was formed against him and his efforts came to nothing.

Charles IX (1550-1574), son of Henry II and Catharine de' Medici (which see), succeeded his elder brother, Francis II, at the age of ten. Even after he was declared of age, his mother, who had acted as regent, was the real sovereign of the nation. His reign was one of the unhappiest in French history, disturbed continually by civil wars, intrigues, and strife between the Roman Catholics and Protestants. Though not vicious, the young king was weak and easily influenced, and so was persuaded by his mother to permit the greatest outrage of his entire reign, the massacre of Saint Bartholomew's Day (August 24, 1572). Charles himself suffered terrible remorse for having given his consent to the massacre, and died two years later. See **SAINT BARTHOLOMEW'S DAY**.

Charles X (1759-1836), younger brother of Louis XVI and Louis XVIII, and the last sovereign of the older Bourbon line of kings, was a striking example of the old saying, "A Bourbon never learns anything and never forgets anything" (see **BOURBONS**). Succeeding his brother, Louis XVIII, in the year 1824, he began at once to revive the old despotic rule which had driven the French people to the Revolution of 1789 (see **FRENCH REVOLUTION**). All liberal measures were disregarded, the clergy was restored to power, the Constitution was ignored, and laws were changed merely by the king's proclamation. In 1830 the people of Paris rose in revolt, and in August of that year Charles abdicated in favor of his grandson, Henry of Bordeaux. The French, however, chose Louis Philippe, Duke of Orleans, as their king. Charles escaped to England, and afterward took up his residence in Austria, where he died. See **FRANCE (History)**.

Related Subjects. Within each of the paragraphs detailing the lives of the above kings are references which should be consulted, to amplify the text.

CHARLES I (1887-1922), popularly known as **KARL I**, was the last emperor of Austria and the last king of Hungary, succeeding his uncle, Francis Joseph, on the Austro-Hungarian throne, November 21, 1916. Before that date he was the Archduke Karl Franz Joseph. Before he became heir to the throne through the assassination of the Archduke Francis Ferdinand, there were many at the Viennese court who had never seen him. In the World War he served at the front as nominal head of the army until German officers assumed the Austrian commands. Upon the defeat of his country, he fled to Switzerland. Later, he secluded himself and family in the Madeira Islands, where he died. His wife, former Empress Zita of Parma, and the six former royal children were later permitted to return to Europe to live; they reside in Spain. See **AUSTRIA-HUNGARY**.

CHARLES [Sweden], the name of several Swedish monarchs.

Charles IX (1550-1611), third son of Gustavus Vasa (see **GUSTAVUS I**), began his rule as regent of the kingdom in 1592, on the death of his brother John. In this position he gave his support to the establish-

ment of Protestantism in Sweden. He was crowned king in 1604, and during his reign engaged in wars with Poland, Russia, and Denmark. Charles was the founder of the University of Gothenburg and the author of a rhymed history of his war with Poland.

Charles X, GUSTAVUS (1622-1660), who reigned from 1654 to 1660, was the nephew of the great Gustavus II Adolphus (which see), and successor of Queen Christina. Soon after his accession he invaded Poland, and having forced Frederick William, elector of Brandenburg, to give him aid, defeated the Poles in a famous battle at Warsaw (1656). During a war with Denmark, he secured for his own kingdom the Danish provinces of Scania and Holland, and laid siege to Copenhagen. The Dutch then came to the help of the Danes, and Frederick William turned against Charles so successfully that the Swedish forces were defeated both on land and on sea.

Charles XI (1655-1694) succeeded his father, Charles X, in 1660, at the age of five, but the kingdom was ruled by his mother, Hedwig, until the boy had reached the age of seventeen. His reign began with wars against the Germans, the Dutch, and the Danes. After the restoration of peace, Charles began a period of reform. He diminished the power of the nobles, cut down the public debt, reorganized the army and navy and brought them to a high degree of excellence, and by his wise management of the public revenues, put the finances of the kingdom on a firm basis.

Charles XII (1682-1718), one of the most remarkable kings of the middle period, was the eldest son of Charles XI, whom he succeeded in 1697. At that time Sweden was one of the great European powers, and the Baltic Sea was practically a Swedish lake. The growing power of the Scandinavian kingdom to the north was jealously watched by three European sovereigns—Frederick IV of Denmark, Augustus of Poland, and Peter the Great of Russia. When the young king ascended the Swedish throne, these rulers decided that the time was ripe for them to strike for the control of the Baltic, and in 1700 the War of the North began.

Charles threw himself into the conflict with a recklessness daring that has won for him the name of "Madman of the North." Though he won several brilliant victories, in the end he overestimated his strength and made a foolhardy invasion of Russia. At Pultowa (1709) his army was nearly wiped out by the forces of Peter the Great, and he fled southward to Turkey. After spending five years in fruitless plots and schemes for revenge, which led to his imprisonment by the Turks, he escaped to Stralsund, a Swedish possession in Prussia. For a year he conducted a brilliant defense of the place, yielding finally to a combined force of Danes, Saxons, Prussians, and Russians. Soon after this, he invaded Norway, and was killed while besieging Frederikshald.

CHARLES, in the history of the Holy Roman Empire, the name of seven monarchs who bore the title HOLY ROMAN EMPEROR. In theory the Holy Roman emperors were successors of Charlemagne, but in fact they ruled over the German dominions and Italy. Excepting Charlemagne (Charles the Great), Charles V and Charles VI were the most important of the emperors who bore the name of Charles.

Charles V (1500-1558) was one of the most powerful sovereigns of the sixteenth century. Heir to the rich

and populous provinces of the Netherlands and to the dominions of Spain and the Austrian House of Hapsburg, he became king of Spain as Charles I in 1516, and was crowned Emperor Charles V in 1520 as successor to Maximilian I. His reign was greatly disturbed by wars with Francis I of France and Solymán the Magnificent, sultan of Turkey. In his second war with Francis I, an imperial army plundered Rome and took the Pope prisoner. Charles and Francis ended their struggles in 1544, but in the meantime the great Reformation movement had developed in the German dominions of the emperor.

Had Charles been able at the beginning of his reign to turn his attention to religious matters in Germany, he might have prevented the growth of Protestantism during his lifetime. When, in 1546, the year of Luther's death, he began serious efforts to suppress the movement, he found the Protestants too strong for him, and by the Peace of Augsburg (1555) it was agreed that the people of each German state should adopt the religion, whether Protestant or Roman Catholic, of the ruling prince of that state. Charles began, however, the persecution of the Protestants in Spain and the Netherlands that were continued by his son Philip II of Spain.

Wearied by his years of warfare and saddened by his failure to make all of his subjects think alike in matters of religion, the emperor in 1555 and 1556 gave up to his son, Philip, the crowns of the Netherlands and Spain, and to his brother, Ferdinand, his imperial authority.

Charles VI (1685-1740), the last of the direct male line of the House of Hapsburg, and the second son of the Emperor Leopold I, was Holy Roman emperor from 1711 to 1740. In 1700, on the death of Charles II of Spain, Charles of Hapsburg claimed the Spanish throne as the rival of Philip of Anjou. This brought on the War of the Spanish Succession, in which Great Britain and Holland aided Charles. When he became emperor of Germany in 1711, Charles was forced by his allies to give up his claim to the Spanish crown, but was permitted to retain the Spanish possessions in the Netherlands and in Italy. In 1713 he published the Pragmatic Sanction, by which his daughter Maria Theresa was to inherit all the possessions of the House of Austria. Charles spent more than twenty years of his reign trying to win the consent of the European powers to the Pragmatic Sanction.

Related Subjects. The reader is referred to the following important articles.

Charlemagne	Pragmatic Sanction
Hapsburg, House of	Reformation
Holy Roman Empire	Spain (History)
Maria Theresa	Succession Wars
Netherlands (History)	Utrecht, Peace of

CHARLES EDWARD, THE YOUNG PRETENDER. See STUART, CHARLES EDWARD.

CHARLES' LAW. See HYDROSTATICS; GAS, subhead.

CHARLES MARTEL, *sharl mar tel'* (about 688-741), a famous leader of the Franks, who won his title of *Martel*, meaning *the hammer*, by his celebrated defeat of the Arabs on the plain of Tours, in A.D. 732. It was this battle which saved the Christian civilization of Western Europe from being overwhelmed by the power of Mohammedanism. Under the last Merovingian kings, Charles held the position of mayor of the palace, but exercised real

kingly authority. He thus prepared the way for his son Pepin.

Related Subjects. The fight at Tours is considered as one of the few decisive battles of the world (see FIFTEEN DECISIVE BATTLES). See, also, MEROVINGIANS, PEPIN.

CHARLES RIVER. See MASSACHUSETTS (Coast and Rivers).

CHARLES THE BALD. See CAROLINGIANS; CHARLES (France); FRANCE.

CHARLES THE BOLD. See BURGUNDY.

CHARLES THE GREAT. See CHARLEMAGNE.

CHARLESTON, THE. See DANCING (The Sensational New Dances).

CHARLESTON, S. C., the largest city of the state, and one of the most conspicuous historical cities in the South. In its harbor, in 1861, the War of Secession began with the bombardment and capture of Fort Sumter, and it was the first Southern city to participate in the Revolutionary War. Charleston is the county seat of Charleston County. It is situated on the southeastern coast of the state, on a tongue of land between the Ashley and Cooper rivers. These two rivers unite immediately below the town to form the spacious harbor which communicates with the Atlantic Ocean at Sullivan's Island, about seven miles below. Savannah is 130 miles southwest, and Columbia, the state capital, 124 miles northwest. Population, 1928, 80,180 (Federal estimate).

General Description. With its stately colonial mansions, its gardens of magnolias, camellias, jessamine, and azaleas, and its wide streets, with their borders of shade trees, Charleston has retained the Southern charm and leisurely spirit that are in sharp contrast with its thriving commercial aspect. Especially is it known for its gardens, which John Galsworthy called the most beautiful in the world. The loveliest of these are the Magnolia Gardens, on the old estate "Magnolia-on-the-Ashley." Created by the Reverend John Drayton, who was ordered by his physician to recuperate his health by life in the open, they are a monument to his exquisite taste. Mr. Drayton planted, in 1843, the first *Azalea indica* grown in the United States. See full-page illustration of these gardens, in article MAGNOLIA.

Charleston has nine miles of water front, and its harbor has been so improved by the construction of jetties as to admit large vessels. Fort Sumter, Fort Johnson, and Fort Moultrie, on Sullivan's Island, guard the harbor, but these defenses are now obsolete; the artillery post at Fort Moultrie is one of the best equipped in the United States. On the Cooper River, seven miles from the city, the government maintains the only navy yard on the South Atlantic coast.

Transportation. The city is served by the Atlantic Coast Line Railroad, the Seaboard Air Line, and

the Southern Railway system. The last-named was one of the first railroads in the United States to be operated by steam locomotives (1830); it extended from Charleston to Hamburg, and was called the South Carolina Railroad. Charleston is also a port of call for important lines of steamers.

Commerce and Industry. The city is a great distributing point and wholesale jobbing center for the Southeast. It is the only coal-export port on the South Atlantic coast; ships coal here for Cuba and South America. There are located in Charleston more than 150 industrial plants. The Standard Oil Company operates an oil refinery here. The city has one of four "tobacco terminals" of the United States, and is the chief tobacco port on the Atlantic. It is also one of the chief shipping centers for commercial fertilizer, and has one of the largest asbestos plants in the world. The principal exports are cotton and cotton goods, oil, tobacco, coal, iron, and steel; leading imports are chemicals, lumber, ore, paper, and cement.

Education. Besides the public-school system, the city has the College of Charleston, dating from 1788; the Citadel Military College, the Avery Normal Institute (colored); Porter Military Academy; and the Medical College of South Carolina. There are also numerous academies and business schools. The library of Charleston is maintained by subscription and is the third oldest in the United States, having been established in 1743. Charleston Museum, founded in 1773, is the oldest in the United States.

History. Charleston is one of the oldest American cities. An English settlement, made here in 1670, was named *Charles Town*, for King Charles II. A company of Huguenots joined the settlement in 1685. By 1775 it had become the third seaport in importance in America. In 1776 the provincial congress of South Carolina met in Charles Town, and in the same year the first independent state constitution was adopted. In 1783 Charleston was incorporated, and until 1790 it was the capital of the state. Its conspicuous part in the War of Secession is told under that title in these volumes.

The city was visited by the greatest earthquake known in the history of the United States, in August, 1886; more than \$8,000,000 worth of property was destroyed, three-fourths of the homes were demolished or damaged, and many people were killed. Since that time the city has made steady progress, as is detailed above.

C.C.M.

CHARLESTON, W. VA., the state capital and the county seat of Kanawha County, is a prosperous industrial and residential city, located in the middle-western part of the state, midway between the northern and southern borders. The city occupies an attractive site in the western foothills of the Appalachians, at the junction of the Elk and Great Kanawha rivers, the latter navigable the year round. It is fifty miles east of Huntington, 272 miles west and south of Wheeling, and 211 miles east and south of Cincinnati, O. Population, 1928, 55,000 (Federal estimate).

Charleston lies between high hills a mile apart. A beautiful, tree-lined boulevard, extending for miles along the banks of the Great Kanawha, is the center of the finest residential district, but everywhere there is a profusion of flowers and foliage. The city is named in honor of the son of Captain Charles Clendennin; the son, George Clendennin, erected a fort in the vicinity about 1789, and a settlement grew around it. The first industry was the exploitation of the salt-brine resources. The place was incorporated as a town in 1794, and as a city in 1870. Since the latter date, it has been the capital of the state, except during the decade 1875-1885, when Wheeling was the seat of government.

Transportation. The city is served by four trunk-line railroads—the Chesapeake & Ohio, the Baltimore & Ohio, the New York Central, and the Virginian; and there is steamboat connection with all the leading ports of the Mississippi and Ohio rivers.

Industry. Rich deposits of bituminous coal, salt, iron, oil, and timber in the vicinity have greatly furthered the industrial prosperity of the city, and the fine shipping facilities by rail and water have made it a distributing point for all these products. In addition to being open to shipping the year round, the Great Kanawha has an excellent system of locks and dams. Charleston is the center of a populous industrial district which includes the territory on both sides of the Great Kanawha from Gauley Bridge, on the east, to and including Scary and Nitro, on the west. More than 40,000,000 tons of coal are mined in one year within a radius of seventy-five miles, which gives employment to 12,000 miners.

Within the city or district are more than 275 industrial plants, including the largest ax factory, the largest sheet-glass factory, and the largest mine-car factory in the world. The Charleston area is a leading center for the production of anhydrous ammonia, amyl alcohol, and chlorine products, and has large railroad repair shops, boat-building yards, veneer works, and lumber mills. It is the location of the only government-owned armorplate factory in the United States.

S P P.

CHARLEVOIX, PIERRE. See CANADA (History).

CHARLOTTE, *sahr' lot*. See LUXEMBURG.

CHARLOTTE, N. C., a city and the county seat of Mecklenburg County, is situated on Sugar Creek, near the southern state line, about midway between the eastern and western borders. Raleigh, the capital, is 174 miles northeast. Population, 1928, 82,100 (Federal estimate).

Industry. Charlotte is the trade center for an agricultural and cotton-growing section, and the kindred cotton industries claim its chief interest; these are cotton-weaving and the manufacture of cotton-mill machinery, cottonseed oil, and other by-products. In this locality there are several hundred textile mills, operating nearly one-third of the active spindles in America. Fertilizers, belting, saddlery, harness, drugs, cement, and various kinds of machinery are also made here. Gold deposits formerly occurred in this section of the state, and a branch mint was estab-

lished here in 1838; at the beginning of the War of Secession it was closed, but was reopened as an assay office in 1869.

This city is one of the largest hydroelectric centers in the United States, and the home of the Southern Power Company.

Education. Educational requirements are met by Davidson College, outside the city limits, Queens College for Women, Presbyterian College, Saint Mary's Seminary, North Carolina Medical College, Elizabeth College, and Biddle University (Presbyterian). Johnston C. Smith University is for colored students.

Railroads. The city has the service of the Southern, the Piedmont & Northern, the Norfolk Southern, and the Seaboard Air Line railways.

History. The place was settled in 1750, was incorporated in 1768, and in 1774 became the county seat. It was named for Princess Charlotte of Mecklenburg-Schwerin, wife of George III.

Here, on May 20, 1775, the Mecklenburg Declaration of Independence (which see) was adopted, and a monument has been erected to its signers. In September, 1780, Lord Cornwallis occupied the city, and during his stay pronounced it a "hornet's nest," a name since then adopted by the city as its emblem. Charlotte was also the headquarters of Gen-



THE BOATMAN OF THE STYX
Old Charon by the Stygian coast,
Takes toll of all the shades who land.

—ST. JOHN LUCAS.

[Illustration is from a detail from a painting by Neide. See article, page 1319.]

eral Gates in 1780, and here in the War of Secession the full Confederate Cabinet met for the last time.

CHARLOTTE AMALIE, *ah mah' le*. See VIRGIN ISLANDS OF THE UNITED STATES.

CHARLOTTETOWN, the capital of Prince Edward Island (which see).

CHARMS, PROTECTION BY. See SUPERSTITION, subhead.

CHARNOCK, JOB, founder of Calcutta (which see).

CHARON, *ka' ron*. In Greek mythology, Charon is the ragged old ferryman of the

Lower World. He is represented as the son of Erebus and Night, bent and old, with matted beard and tattered garments. Gloomily, with one oar, he ferried the shades of the dead across the rivers Styx and Acheron to the realm of Hades. But the mythological story tells us that only those would he take who had had a

proper burial, and in whose mouths was placed an obolus, the coin Charon exacted as his fee. All others were compelled to wander wearily on the shores of the river for a century; after that time, Charon would take them without charge to their final resting places.

Charon appears frequently in literature and art. Homer does not mention him, but he is pictured in Vergil's *Aeneid*. The hero Aeneas is ferried across to Hades in the boat which had previously carried only shades. Though Charon for a long time refused to perform this service, he was finally persuaded to do it. The great painting by Polygnotus, *Odysseus in the Lower World*, shows this ancient ferryman. On some early Etruscan monuments he appears as an ugly, animal-faced demon of death, with tusks and pointed ears, carrying snakes or a large hammer. One of the best of the paintings illustrating the myth of Charon is by Neide. See STYX; ACHERON.

CHARR. See TROUT.

CHART, a map or drawing made for a particular purpose, in which accuracy of detail is the chief requirement. The one possibly in most common use is the *mariner's*, or *hydrographic*, chart. This shows a seacoast with

every detail of rock, shoal, depth, sounding, bank, channel, bay, and harbor so exactly located that a ship may be guided safely by it through the most dangerous seas. The *topographic* chart, also common, shows with similar accuracy the details of any land surface and is mainly for the guidance of military men and surveyors. *Climatic* charts present by outline and diagram the rainfall, temperature, and direction of the winds of certain localities.

These are prepared daily by the United States Weather Bureau and are designed to be of aid to navigation, by giving warning of storms, and also for the information of all people whose activities may depend upon weather conditions. There are *celestial* charts also, on which stars and constel-

lations are correctly shown, and *heliographic* charts, which locate the spots on the sun's surface. A great variety of *educational* charts are used in teaching. R.H.W.

Related Subjects. In these volumes almost every kind of chart is shown. See the article ASTRONOMY, for astronomical charts; UNITED STATES, for agricultural charts; WEATHER BUREAU, for those explaining storms and temperature; the various state articles, for production charts, etc.

CHARTER, a written instrument or contract given by a government authorizing the holder, whether a person, corporation, or local government, to organize and conduct its business. Charters are granted by states to banks, corporations, and associations, authorizing them to conduct their business within specified limits. A state

or province by charter authorizes the organization of a village or city government; the charter sets forth the powers and obligations of such a government. See CORPORATION.

Most Famous Charter. The Magna Charta, or Great Charter, granted by King John of England in 1215, is the world's most historic charter. It conferred on the English-speaking world the privileges which became the foundation of the liberty of Britain, Canada, Australia, South Africa, and the United States. See MAGNA CHARTA.



THE CHARTER OAK

Tradition points to the tree in the upper illustration as the Charter Oak. Below is the Charter Oak Monument, in Charter Oak Place, Hartford, on the spot where the tree stood.

CHARTERED ACCOUNTANT. See ACCOUNTANCY.

CHARTERHOUSE. See CARTHUSIANS.

CHARTER OAK. This historic tree is said to have concealed the charter of Connecticut for two years. Its age was computed at nearly a thousand years when it was blown down in August, 1856. A white marble monument now marks the spot in Charter Oak Place, in the city of Hartford. See page 1319.

James II, having found Connecticut's charter a barrier to his plan to make that community a part of his New England, had, in 1687, sent Sir Edmund Andros, the governor-general of New England, to Hartford to demand the delivery of the charter. Appearing to submit, the colonists went to the council chamber to carry out the ceremony, but while they were there the lights were snuffed out, and the document was carried to a hiding place in the hollow of a tree. There it remained until the deposition of Andros. Early reports of this incident referred to the tree as an elm. Some people declared that the paper was hidden in the home of a prominent colonist, but about 1789 the belief became settled that this oak had concealed the famous charter. See ANDROS, SIR EDMUND.

CHARTISM, *char' tiz'm*, which may be defined as the principles and practices of a group of political reformers in England, grew out of the oppressive conditions under which workingmen once lived, and was a movement which attempted to improve their condition. The Reform Bill of 1832 had bettered matters somewhat, but had not silenced the discontent, which by 1838 had become acute. From that date until 1848, the Chartist movement was at its height. A formal demand, known as the National People's Charter, called for six reforms: (1) universal suffrage; (2) equal electoral districts; (3) vote by ballots; (4) annual Parliaments; (5) no property qualifications for members of Parliament; (6) salaries for members of Parliament.

Monster meetings were held, and huge petitions were presented to Parliament. Directly, the movement accomplished nothing, though it left an influence on the people's trend of thought. The repeal of the odious Corn Laws brought improved conditions, and after 1848 the movement languished. See CORN LAWS.

CHARTREUSE, *shahr truz'*. See CARTHUSIANS.

CHARYBDIS, *ka rib' dis*. See SCYLLA.

CHASE, SALMON PORTLAND (1808-1873), an eminent American statesman and jurist, who as Chief Justice of the United States Supreme Court presided over the impeachment trial of President Johnson. His greatest fame, however, was achieved in the Cabinet of President Lincoln. He was born in Cornish, N. H., and was educated at Dartmouth College. After

studying law in Washington, D. C., he began to practice in Ohio, where he took part in the defense of so many runaway slaves that the slaveholders of Kentucky nicknamed him "the attorney-general of fugitive slaves." He became the recognized leader of the anti-slavery movement in Ohio, and throughout a term of office as United States Senator, from 1849 to 1855, he vigorously opposed the extension of slavery into the new territories and the passage of the Kansas-Nebraska Bill (which see).



Photo Brown Bros

SALMON P. CHASE

The Liberty party in 1843, and the Free-Soil party in 1848, had called upon him to prepare their national platforms.

Chase was elected governor of Ohio in 1855 and again in 1857. He had by that time joined the new Republican party, and in 1860 was one of the candidates for the Presidential nomination. Failing to secure this honor, he accepted the office of Secretary of the Treasury under Lincoln. His career as a Cabinet officer marks him as one of the great secretaries, for during the perilous years of the War of Secession the national credit was maintained, funds were secured to carry on the struggle, and a new national banking system was created. Differences with Lincoln regarding war policies caused him to resign in 1864, and in the same year Lincoln appointed him to succeed Chief Justice Taney as head of the Supreme Court.

CHASE, SAMUEL. See IMPEACHMENT.

CHAT. The chats are small, lively birds of the wood-warbler family. During the mating season, the males perform many extraordinary twists and turns in the air, suggesting their common nickname of "clown among birds." Their song, which gave them the name chat, is a mixture of whistles, wails, clucks, and chuckles. In the Eastern United States and Canada, the *yellow-breasted*, or *polyglot*, chat is a larger species, olive-green above and white below, with a yellow breast. It builds its nest in briary thickets, and eats insects chiefly. A subspecies, the *long-tailed chat*, is found in the West. D.L.

Scientific Names. The chats belong to the family *Mniotiltidae*. The yellow-breasted is *Icteria virens*. The long-tailed has, in addition, the distinguishing name *longicauda*.

CHÂTEAU, *shah toh'*. See FRANCE, illustration.

CHÂTEAU THIERRY, *shah toh' tyeh re'*. See WORLD WAR (1918).

CHATHAM, EARL OF. See PITT, WILLIAM.

CHATTAHOOCHEE, *chat a hoo' che*, **RIVER**, a large muddy stream which forms about half of the boundary between Georgia and Alabama. It rises in Northern Georgia, in the Blue Ridge, flows southwest and then south, and after its junction with the Flint River, receives the name of Apalachicola. For two-fifths of its entire course of 500 miles, it is navigable. It furnishes water power to Columbus, Ga., by reason of its descent of 120 feet in three miles. See **GEORGIA (Rivers)**; **ALABAMA (Rivers)**.

Derivation. The Creek Indians named the river *Chattahoochee*, which means *pictured rocks*, because of the vari-colored rocky banks.

CHATTANOOGA, *chat a noo' gah*, **BATTLE OF**. See **WAR OF SECESSION**.

CHATTANOOGA, **TENN.**, an historic city, the county seat of Hamilton County, is an important railroad center and a rapidly developing industrial city in the southeastern part of the state, near the Georgia line. The city is 150 miles southeast of Nashville and 140 miles northwest of Atlanta.

It is beautifully situated on the south bank of the winding Tennessee River, in a great natural amphitheater, surrounded by historic and picturesque hills. Southeast of the city is Lookout Mountain, from whose summit, 2,126 feet above sea level, seven states are visible. East and south is Missionary Ridge; a short distance southeast in Georgia is the battlefield of Chickamauga, now a national military park comprising nine square miles. Throughout the grounds, monuments and historical tablets have been erected by the various states in honor of their soldier dead. Fort Oglethorpe, a brigade post of several thousand acres, adjoins the park. During the Spanish-American War, in 1898, Fort Oglethorpe was a mobilization camp; 60,000 soldiers were encamped at one time on the Chickamauga battlefield. Immediately southeast of the city is one of the largest national cemeteries, containing 13,322 graves. Signal Mountain, north of the city, and Lookout Mountain are popular pleasure resorts.

Industries. The city carries on a considerable trade in cotton, grain, coal, iron ore, and manufactured products, but is chiefly important as a manufacturing center. Hydroelectric power is ample for more than 380 industries, which manufacture over 1,300 articles. Among many large industrial plants are manufactories of iron and steel, textiles, boilers, machinery, furniture, refrigerators, paper, and stoves.

Transportation. The geographical location of Chattanooga, a natural gateway between the hills, has made the city an important railway center. It is on the Alabama Great Southern; the Central of Georgia, the Southern Railway system, the Nashville, Chattanooga & Saint Louis; the Cincinnati, New Orleans & Texas Pacific; the Tennessee, Alabama & Georgia; and the Western & Atlantic railroads. The Tennessee River is navigable to this point for eight months of the year.

Education. Chattanooga is the seat of the University of Chattanooga (Methodist Episcopal), the Chattanooga College of Law, Baylor School, McCallie School, the Girls' Preparatory School, and the Signal Mountain School for Girls.

History. In the early days, river voyagers landed here to avoid the rapids of the Tennessee River, and the locality, settled about 1835, was known as Ross's Landing. Ross was the name of a Cherokee chief whose people were moved west by the government in 1838. In 1851, the town was incorporated as Chattanooga, and it became a city in 1866. During the War of Secession, it was one of the most important strategic points in the Confederacy, and the struggle for its possession led to some of the severest battles of the war. In the course of the fighting, the city was almost destroyed. Immediately succeeding the war, the manufacturing of iron was begun, to restore the ruined railroads; a long period of development and prosperity followed, and the city has become one of the important industrial centers of the South. In 1911 the commission form of government was adopted. The population in 1928 was 73,500 (Federal estimate). Close about the city are a dozen populous suburbs, increasing the number of people in the community to more than 148,000. C.J.K.

CHATTEL, *chat' l*, a term closely akin to the word *capital*, used in law to mean almost the same thing as the phrase *personal property* (which see). There is, however, a slight difference technically, chattels being only such personal property as can be physically delivered. Thus, money in hand is a chattel, but a claim for money due is not.

Chattels may be *personal* or *real*, the former being all such movable articles as furniture, money, or clothes. A *chattel real*, on the other hand, is any interest in land less than actual ownership, as a lease or a mortgage. Growing crops also come under this title. The term *goods* is narrower than *chattel*, meaning practically the same as *chattels personal*, and the commonly used expression *goods and chattels* is thus a mere repetition for emphasis, as the first word adds nothing to the meaning. See **MORTGAGE (Chattel Mortgage)**.

CHAUCER, *chaw' sur*, GEOFFREY (about 1340-1400). While we lack many details about the life of this first great poet of England, we are indebted to him for a remarkable picture of the life of his times. In the *Prologue* to his *Canterbury Tales*, known to every high-school student, Chaucer describes, with a vividness that makes them real persons after five centuries, the knight and the squire, the yeoman and the monk, the housewife and the nun, and many other types of English character. The bright humor and sprightliness of this great work, which the poet left uncompleted at his death, reveal his charm and keen interest in

humanity, but never suggest the worries and troubles he had to bear.

Chaucer was born in London, where his father was in the wine business. Of his boyhood or his education, little that is authentic is known. It is certain, however, that during the English invasion of France, 1350-1360, he was imprisoned, ransomed by the king, and taken into royal service as a squire. That he was an efficient servant is shown by the fact that he was sent on several important missions to the Continent, and to these journeys may be traced the French and Italian influences evident in his works.



GEOFFREY CHAUCER

In 1374 he was made comptroller of customs for London, and in 1386 he was elected to Parliament. At times during the latter part of his life, when the political party to which he belonged was not in power, he was very poor, and not until a year before his death was he given permanent financial relief by the king.

Chaucer's Place in Literature. Chaucer has been called the "Father of English Poetry," and the passing years only strengthen our belief in the justice of this title. There were writers of verse before him, some of more than average ability, but he was the first to show that poetry, masterly in technique as well as in



Photo Visual Education Service

HOME OF CHAUCER

content, could be written in the shifting, developing English language of his age. Because he chose the Midland dialect for his popular work, the other dialects then in common use—Northumbrian and Mercian—were destined to lapse into obscurity. Thus, he may be said to have fixed, in a large degree, the form of our present language.

His first works were translations, or at least adaptations, from the French, but later the Italian writers became his models, and under their domination he produced such poems as his beautiful *Troilus and Cryseyde*, *Legende of Good Women*, *Palamon and*

Arcite, and *The Parlement of Foules*. In his third and greatest period, he was thoroughly English in theme and style, though the plan of his greatest work, the *Canterbury Tales*, was one which had been used before in Italy by Boccaccio. The dramatic ability shown in his descriptions of characters in this remarkable work has led many to speculate as to what Chaucer might have become in an age when the drama was the chief form of literature; but he lived in a story-telling age, and the ability to tell a story was perhaps the greatest of all his gifts. See *CANTERBURY TALES*, *ENGLISH LITERATURE* (The Age of Chaucer).

CHAUDIÈRE, *sho dyair'*, **RIVER**, a scenic stream of the province of Quebec, Canada, famed for its beautiful falls, which attract many visitors. Its steep, rocky banks and the many little wooded islands which obstruct its channel are most picturesque. The Chaudière has its source in a number of small streams which flow into Lake Megantic near the border of Maine, and only a few miles from the source of the Kennebec. Issuing from Lake Megantic, the Chaudière flows northward and then north-westward in a wide curve, and after a course of 120 miles empties into the Saint Lawrence about seven miles above the city of Quebec. The falls, which are two and one-half miles from its mouth, make it of little value for navigation. See *QUEBEC* (Rivers and Lakes); *SAINT LAWRENCE*, *GULF OF*.

CHAULMOOGRA, *chawl mo' grah*, **OIL**. See *LEPROSY*.

CHAUTAUQUA, *sha tauk' wah*, a name given to a remarkable system of popular education, which is the evolution of a Sunday-school assembly held at Chautauqua Lake, New York, in the summer of 1874, for the instruction of Sunday-school teachers. The movement was popular from the first, and has increased from year to year in scope until it has grown to large proportions. It now has more than fifteen departments in its summer schools, and an assembly attended by 40,000 to 50,000 persons annually; there is also a home reading circle with thousands of members, and it has property on Chautauqua Lake worth much more than a million dollars, with over 600 cottages and public buildings for its summer population.

Chautauqua Institution. The plan of the founders of the movement—Lewis Miller of Akron, O., and Rev. (afterward Bishop) John H. Vincent—was for religious instruction only, but the scope of the work soon broadened until it aimed at an education that should be at once intellectual, ethical, and spiritual. In 1879 a group of schools was established with graded courses of study covering four years, in which literature, art, history, and pedagogy were taught. This system now embraces courses in English, European, and ancient literature, history, pedagogy, and nearly all the arts and sciences. George Vincent, then president of the University of Minnesota, son of Bishop

Vincent, became president in 1907. His successor as president was Arthur E. Bestor. See VINCENT, JOHN HEYL.

The sessions of the schools are held during the months of July and August. An important feature of the Chautauqua movement has always been the popular exercises of the



LOCATION OF CHAUTAUQUA

summer assembly. They consist of talks on interesting topics, lectures by noted speakers from all over the world, concerts, and various recreations. These are free to visitors.

Chautauqua Literary and Scientific Circle, the name given to the home reading course, is the best-known branch of the Chautauqua work. Each course consists of four years of reading, known as American, English, European, and Classical years, and includes history, art, travel, literature, and science. The work of each year is complete in itself, and each member of the Circle reads the same books. In addition, there are eighty-eight courses for those who wish to specialize. The books used are specially prepared for the courses. Diplomas are awarded.

The Chautauqua Literary and Scientific Circle was organized in 1878 with the idea that it would meet a recognized want with persons who had been denied a liberal education, and would appeal to old and young alike. It proved amazingly popular, 7,000 enrolling the first year; 70,000 readers have completed at least one course. The idea pleased the English so well that they patterned their British Home Reading Union after it. Branches of the Chautauqua system have been established in Japan and South Africa.

Local "Chautauquas." The idea of the Chautauqua Assembly spread through America, and local "Chautauquas" sprang up everywhere, but they do not have any connection with the original Chautauqua. These assemblies employ popular lecturers and other entertainers and hold sessions of several days, which are largely attended. There are 4,000 of these "Chautauquas."

CHEAHA, MOUNT. See ALABAMA (The Land).

CHEBOYGAN, *she boi' gan*, RIVER. See MICHIGAN (Its Rivers).

CHECK, OR CHEQUE, an order written by anyone who has money deposited in a bank, instructing the bank to pay a specified sum to a person named or to the bearer. Once a California lumberman was buying a section of timber land, in order not to lose his option, he was obliged to make a hurried payment, and, picking up a shingle, he wrote on it, *Blank National Bank, San Francisco, pay J. H. Sullivan ten thousand dollars*, then added his name and the date. This order was just as much a check as though it had been written on the printed forms of his bank, and as such the bank treated it.

Very nearly all the business of the United States and Canada is carried on by means of checks, though in other countries they are less popular. The checking system, with its assistant, the clearing house, makes it possible for a community to transact many times as much business with a given amount of currency as it otherwise could carry on. Thus, in great cities, checks to the value of millions of dollars are drawn daily, yet only a small amount of cash changes hands.

A Checking Account. When you deposit money in a checking account, you are required to sign your name on a card, which the bank preserves so that if any other person attempts to get money by writing your name, the forgery may be detected. The teller gives you a *bank book* and a *check book*. The first shows the amount of your deposit, and every time you add money to your account, you take the book with you, so that the teller may record the deposit in it. Formerly, once a month the deposit book was returned to the bank so that the bookkeeper could record the money which the bank paid out for you, but this system has been almost entirely superseded by a monthly "statement" from the bank. The check book contains blank checks; when you wish to pay out money, you fill out one of them; an approved form is shown in the illustration.

For each check there is a stub on which is space for a memorandum of the particulars of the check and for addition and subtraction of amounts deposited and withdrawn. It is a wise plan to number your checks and their stubs, so that at the end of the month, when the bank

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returns to you your paid checks, you can quickly discover which ones are still unpaid. The balance shown in your bank book should be greater than that shown in your check book by the sum of the checks outstanding; if it is not, either you or the bookkeeper has made an error. If you wish to give a check when you do not have your check book with you, it is permissible to take another bank's blank check, cross out the name and substitute that of your own bank, but this is not advisable, because you may forget to record the amount later in your check book.

Your signature on a check must always be like the copy given the bank; for instance, if the latter is *John A. Low*, you must not sign *J. A. Low*.

Checks in the United States generally carry the words *Pay to the order of*.....; sometimes the form is *Pay to*..... or *Bearer*, but the latter is not recommended, for if a check payable to *bearer* is lost, anyone who finds it may cash it. The word *order* means that by endorsing (see below) the check the owner may order the money paid to another. If you yourself wish to draw cash from your account, you may write a check payable to *Self* or to *Cash*.

An advisable step is to write the purpose of each check on its face. Thus, if you are paying a bill you may write *In full of account to date*, and when your creditor endorses and cashes the check, it becomes a receipt. A check does not, however, constitute a payment until the bank *honors* it, that is, pays out the money for which it calls, so it is never wise to give a receipt for an account paid by check unless the manner of its payment is stated on the receipt.

Endorsing a Check. If you receive a check, you may get cash for it, transfer it to another person, or deposit it to the credit of your account in the bank. If you are cashing it, you

merely sign your name on the back, across the left end. This form is called *endorsement in blank*, and you should not execute it until you reach the bank, for if you lose the endorsed check, anyone can present it for payment. If you are making the check over to another person, the correct form of endorsement is *Pay to the order of (name)*, followed immediately by your signature. This is called *endorsement in full*; it obliges the man to whom you transfer it to add his endorsement, thus admitting that he has received the value named; whereas a check endorsed in blank might be permitted carelessly to go through a dozen hands and receive no signatures except that of the last possessor.

Your signature to an endorsement should read exactly like your name as written on the face of the check by the drawer, even if he has misspelled it, but in the latter event you must write your correct bank signature immediately beneath the other. When you endorse a check you become responsible for its payment if it proves to be worthless, so too much care cannot be exercised.

Worthless Checks. Many people are careless about keeping account of the checks they issue, and occasionally write one for more money than they have in the bank. If you receive and dispose of a check for ten dollars and the drawer has only nine dollars and ninety cents in the bank, the check will be returned to you marked *Insufficient Funds*, or *N. S. F.*, which stands for *Not Sufficient Funds*. Since a bank honors checks in the order in which they are presented, not the order in which they are made out, it is always wise to dispose of a check the same day it is received.

If a check is returned to you for insufficient or no funds and there are endorsements on it above yours, you must *protest* the check at once, if you wish to hold the endorsers responsible. *Protesting* consists in giving a formal,

legal, sworn notice of non-payment. A *post-dated* check, one issued before the date it bears, is not due until that date.

Certified Checks. If someone has given you a check and you doubt its worth, it is a good plan to take it to his bank and have it marked *Certified* by the bookkeeper before depositing it in your own bank. The certification makes the bank responsible for payment. Sometimes you may wish to have a check of your own certified, especially if you are sending it some distance. A certified check should not be confused with a cashier's check, which is a bank's own order to pay.

Exchange. It is customary for a bank to charge a fee for accepting a check payable in another town, even if it is drawn on a branch of the same bank. This fee varies according to the amount of the check. When sending a check to a person in another place, you should add the presumable amount of the exchange to the amount you are paying. Never write *Forty Dollars and exchange*, for a check must indicate a definite amount.

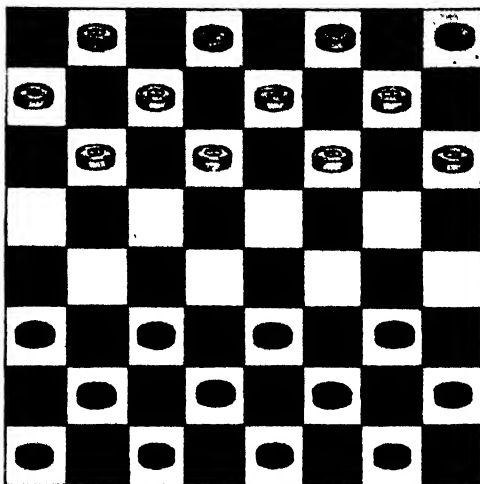
Stopping Payment. If after you have given out a check, you wish for any reason to prevent its payment, you may do so by giving written notice to the bank and releasing the bank from responsibility for error. This is the proper course to follow with a lost check; if a second one is then issued, it should be plainly marked *Duplicate*, in red ink.

Protecting a Check. If a forged check is cashed, the bank is the loser, but the loss on a *raised* check (one on which the amount has been fraudulently increased), even though the signature be genuine, must be met by its maker. It is therefore wise to use extreme care, in making out a check, to leave no blank spaces in or after the statement of amount. A good form to follow is shown in the illustration. There are a number of patent "protectors" on the market, with which the amount for which a check is drawn may be indelibly indicated.

F.H.F.

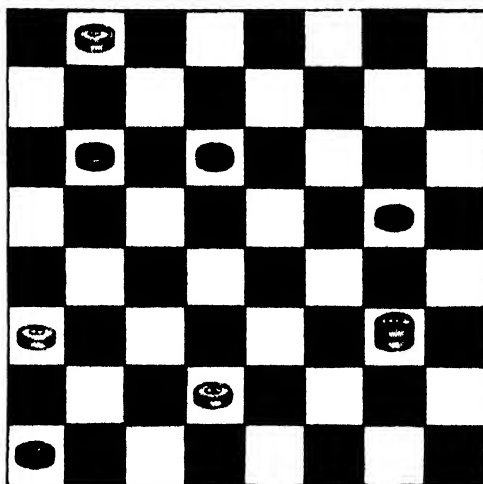
CHECKERS, OR DRAUGHTS, draughts. This game, for both young and old, is a battle of wooden "men" on a cardboard field, the players being the generals. The board has sixty-four alternating black and white, or black and red, squares, either black or white squares being used as the "line of march," or the spots upon which the "men" move. Each of the two players is given a set of twelve men, small round pieces of wood or bone. The two sets are of different colors, or "uniforms," usually black and white. These men are placed on the first three rows of black or white squares on each side of the board, leaving two open rows in the center. Each player in turn moves forward one man at a time and always diagonally, following the squares of the chosen color.

The object of the game is to capture all the enemy's men or to move the men so skilfully that the progress of the opponent's men is blocked. If a man is moved next to an enemy's man and an open space is left behind him, the opposing man may jump over to the next



BOARD SET FOR PLAY

open square and so capture a man and get farther into the enemy's lines. More than one may be captured at a time if there are alternate

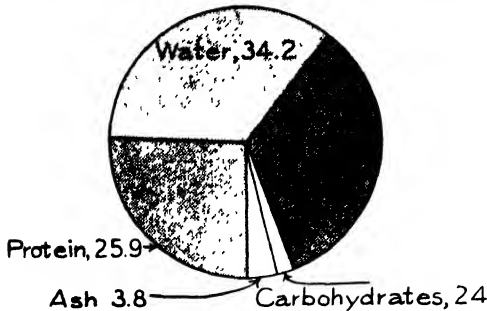


A TEST PLAY

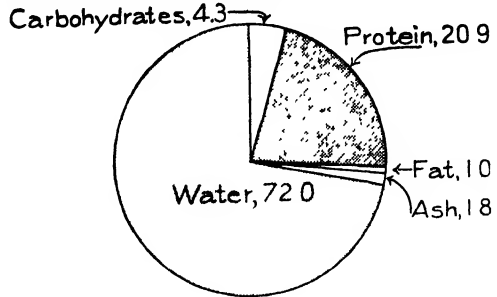
In the illustration, a game has nearly reached its close. The white plays next and should win the game.

men and open spaces in a forward line. As each man is captured, it is removed from the board. If a man of one side gets across the board to the rear line of squares of the other side, he is *crowned*, or made a *king*. That is, the enemy gives up one of the men he has

captured and puts him on top of the man to be *kinged*. A king may move either backward or forward one square at a time, except when making a capture, so he has the advantage over all other men. The game is won when one



be forced out. Sometimes all the butter fat of the milk is left in it; in this case the cheese is known as full-cream; sometimes but a part is left, and half-skim cheese results. Full-skim cheese, which contains no butter fat, is



COMPOSITION OF CHEESE
At left, full-cream cheese, at right, cottage cheese.

side has captured all the men of the other side; or if a blockade is caused on the board where all the men of one side are hemmed in by the other and any move means capture.

There are other rules in the game of checkers, which some players observe and some do not. For instance, if one side fails to capture a man of the enemy, either through oversight or because it would place his man in a dangerous position, the opponent may compel him to capture the man, or may remove the delinquent soldier from the board, and then has the privilege of the next move.

Checkers is a very ancient game, known by the Egyptians, Greeks, and Romans. It is said that the Egyptians played a similar game as early as 1600 B.C. It was played in Europe in the sixteenth century. An old form of checkers is known in China as "the game of circumvention."

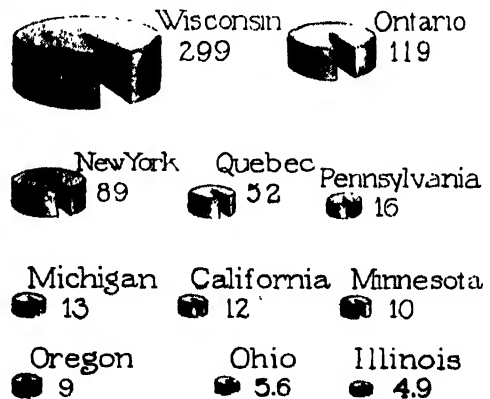
CHEDABUCTO BAY. See CAPE BRETON ISLAND.

CHEESE, an important food, made chiefly from the "curds" of milk, the product of a flourishing industry in every grazing and agricultural section.

Process. The simplest variety is the cottage cheese, or Dutch cheese, made by many housewives. To make this, the milk is allowed to curdle and then subjected to a very gentle heat, as great heat toughens the curd. The whey is then drained off, the curd is salted, and if desired, cream is mixed with it. By far the larger part of the commercial cheese is made in factories, and the process, though differing in details, is practically the same in its essentials for the various kinds. This process includes curdling the milk with acid or rennet, separating the whey from the curd, grinding and salting the curd, and packing it in molds of various sizes and shapes. These are then subjected to pressure, that all the whey may

in general hard, tasteless, and horny, and in some places its manufacture is forbidden. All except the cottage variety are the better for being ripened for several months in a cool place.

Kinds. Some kinds of cheese are hard, some are soft, according to the method of ripening or the amount of water which is allowed to remain in them. Certain kinds, chiefly made in Europe, are famous and in great demand. These include *Roquefort*, a soft cheese which has been allowed to ripen until a harmless blue mold has formed through it; *Edam*, a hard, yellow cheese sold in red-painted balls;



Figures Represent
Millions of Pounds

WHERE CHEESE IS MADE

The figures given represent average production over a period of four years.

Parmesan and *Gorgonzola*, hard cheese; *Swiss*, a hard cheese which is somewhat porous and filled with Swiss "eyes"; and *Neufschâtel*, *Camembert*, and *Limburger*, all soft cheese. The

United States makes mostly *Cheddar* cheese, commonly known as American cream cheese, nine-tenths of its huge product being of that variety.

Amount Produced. Canada and the United States are among the greatest cheese-producing countries in the world. In Canada the standard has been kept high by the passage of laws forbidding the sale of skim-milk cheese, and the result has been great popularity for Canadian varieties in other countries. Almost 200,000,000 pounds are exported every year. Ontario alone exporting more than the entire United States sends abroad.

In the United States, the production of cheese, including that made on the farms, amounts to over 465,000,000 pounds a year. Seventy-two per cent of America's cheese is produced in Wisconsin. The exports, approximately 17,000,000 pounds, are greatly overbalanced by the 30,000,000 or 40,000,000 pounds imported from Europe in normal years. Many foreign brands of cheese are now made with considerable success in the United States.

Food Value. Cheese long had the name of being a very indigestible substance, and later a saying gained currency to the effect that "cheese digests everything but itself." But experiments have proved conclusively that by most people cheese is easily digested. Occasionally, there is a person who cannot eat it, but there is scarcely a food, however wholesome, of which the same may not be said. There are also highly nutritive qualities in cheese, which contains a large percentage of tissue-building and of energy-forming substances. As a heat-producer, cream cheese ranks high, and should therefore be used more in winter than in summer. Its fuel value averages 2,000 calories per pound, or almost three times that of an equal weight of eggs. The older the cheese the more digestible it is, as aging and curing peptonizes the curd and helps to make it soluble. See CALORIE; FOOD (Chemistry of Food). E.H.F.

CHEETA, CHEETAH, *che' tah*, OR HUNTING LEOPARD, *lep' ard*, a large cat of the African jungles, three or four feet high, and about the length of a leopard. Its limbs are so slender and its body so long that it is the quickest animal known for running short distances. Because of this fact, it chases its prey, and does not crouch and steal upon it, like most of the cats. It differs from other cats, too, in having blunt claws that can be only partly drawn into the foot (see CAT). Tawny-colored, black-spotted, excepting on the throat, the skin of the cheeta is valued for wearing apparel by the chiefs of African tribes.

The cheeta is also well known in India, where it is tamed and trained for hunting. Like a falcon, it is held in leash and kept blindfolded until the game is seen. Then, on being loosed, it makes a quick dash for

the animal, which it holds down until the hunters come. The cheeta becomes very docile in captivity. M.J.H.

Scientific Name. The cheeta belongs to the family *Felidae*. It is classed as *Cynaelurus jubatus*.



Photo U & U

THE CHEETA

CHEKHOV, *chek' kawf*, ANTON. See RUSSIAN LITERATURE.

CHELAN, LAKE. See WASHINGTON (state).

CHELSEA, *chel' se*, MASS., in Suffolk County, is a residential suburb of Boston, three miles northeast of the city and connected with it by the Boston & Maine Railroad, electric and motorbus lines and steam ferries. The Mystic River, which separates Chelsea and Charlestown, a part of Boston, is crossed by a long bridge. Chelsea is the home of United States Naval and Marine hospitals and of the Massachusetts Soldier's Home. Ye Old Pratt House, a Revolutionary tavern, is of interest.

The city was settled in 1626 as Winnisimmet. A part of Boston from 1634 to 1638, it was then incorporated as the town of Chelsea, and became a city in 1857. The city suffered a \$17,000,000 property loss by fire in 1908. Population, 1928, 49,800 (Federal estimate).

Industry. Although principally a residential city, it has about 200 industries, large and small, including important manufactories of rubber and elastic goods, foundry and machine-shop products, stoves and furnaces, tiles, pottery, mucilage and paste, shoes, woollens, brass goods, wireless apparatus, lithographs, etc.

Education. Chelsea maintains a Hebrew Free School, and recognizes its responsibility for aliens by providing Americanization classes and evening schools. H.K.

CHEMICAL AFFINITY. See **ATTRACTION.**

CHEMICAL ANALYSIS. See **ANALYSIS.**

CHEMICAL COMPOUNDS. See **CHEMISTRY**, subtitle.

CHEMICAL ENERGY. See **STORAGE BATTERY.**

CHEMICAL ENGINE. See **FIRE DEPARTMENT.**



CHEMISTRY, *kem' is trië*. One of the most wonderful of the sciences, chemistry deals not with the appearance or the value of matter, but with its composition. In seeking to discover just what every substance is made of, it investigates both the seen and the unseen. One can define chemistry in seven words by describing it as "the science of the composition of substances," but this definition does not reveal the romance and the glamour that invest it. It is chemistry that has made clear the fact that the flashing diamond, gritty, black charcoal, and soft, leadlike graphite are all composed of one substance—carbon; it is chemistry that has proved that the rusting of iron is essentially the same kind of process as the burning of wood. These and thousands of other wonderful facts are revealed by chemistry, which enters, too, into our problems of everyday living (see below, *Contributions to Human Welfare*).

Growth of the Science. It might seem as though, in the development of sciences, chemistry would have been the very last one to appear, for much of that with which it deals cannot be handled and is invisible, and could never force itself upon the attention of anyone. For instance, water has always been one of the central substances about which man's life has grown up, and man has therefore needed to have considerable knowledge of water. But if he knew where it was to be found; that it would quench thirst, put out fires, and help all living things to grow; that it would not run uphill unless forced, and had a tendency to "seek its own level"; he had enough practical facts to live by. What mattered it to him whether water was an individual substance or a compound of other substances?

Alchemy. But there was one substance in which, by reason of their greed, men early became especially interested. That was gold. If they could just find out how gold was made, they could have plenty of the precious metal without all the labor and expense of mining it. And thus, many centuries ago, men began to study into the composition of substances that they might find something which would turn

less valuable metals into gold. This study became known as *alchemy*, probably from *Chemia*, an old name of Egypt, the country where the study first grew up. See **ALCHEMY**.

Beginnings of a True Science. Needless to say, these alchemists, or philosophers, as they called themselves, never succeeded in making gold, but they did something quite as valuable, in leading the way to the science of chemistry: In their experiments they inevitably discovered many things for which they were not looking—properties of matter, new substances and new ways of making old ones, and above all, the healing properties of drugs. Medicine in its modern sense grew up side by side with chemistry.

Strange theories were formed from the half-known facts as they emerged, and one of these theories, common in the early years of the sixteenth century, concerned itself with the relation between medicine and chemistry. The body, said these early chemists, is made up of various chemicals—and then each proceeded to make for himself a list of these body substances. If one of the chemicals was present in excess, they argued, disease was certain to result, and many illnesses were labeled as growing out of too much or too little of some one substance. Paracelsus, the greatest of these doctor-chemists, really effected many cures and made discoveries that are of the utmost value to modern pharmacy. But men knew too little of anatomy and physiology, as well as of chemistry itself, to carry this really helpful phase of the science very far.

Later Development. Finally, there arose men who realized that if this study of substances and their composition was to become a real science, it must be carried on for its own sake and not by reason of its relation to gold-making or to healing. Then real progress began, though chemistry as an exact science can be said to date only from the latter half of the eighteenth century. Remarkable advance was made in the nineteenth century, which witnessed three momentous discoveries—the electrical basis of matter, the X-ray, and radioactivity; with these clues, twentieth-

century scientists have gone far from the old ideas of substances and their transformations, and have developed a new philosophy of the structure of matter and the nature of chemical change. The world is now on the verge of even greater discoveries, and chemists, physicists, astronomers, and other scientific leaders, with many of the old barriers down, are working together to solve the riddle of the universe.

Modern research continually emphasizes the dependence of other sciences on chemistry, for the special problems of each, in the last analysis, are concerned with the nature of matter. The physicist strives to explain the natural phenomena he sees everywhere about him, but these are manifestations of matter. The astronomer finds the answers to many of his questions about the stars when he learns their chemical composition. The processes that interest the geologist are chemical changes of matter. Every discovery that leads men nearer to an understanding of matter brings to light the close interlocking of all these sciences.

Divisions of Matter. Looking about us, we see hundreds of different substances, materials, and objects, existing as forms of matter, and can think of countless others. From the standpoint of the chemist, however, there are two kinds of matter, the elements and the compounds. These are discussed in considerable detail in subsequent paragraphs. It is sufficient to say here that the elementary substances are those that man is unable to resolve into simpler substances by ordinary methods. Compounds are combinations of two or more elements. Water, a combination of hydrogen and oxygen, is an example of a compound; so, too, is sugar, which is composed of three elements—carbon, hydrogen, and oxygen. Sulphur is an element; sulphuric acid is a compound.

Chemically speaking, these two kinds of matter, the elements and compounds, make up all of our material universe—all minerals, all plant and animal life. Even our sun and the stars in space contain most of the elements found in the earth.

Matter Made up of Atoms. In their study of elements and compounds, chemists long ago discovered that elements always combine in a pure compound in a definite ratio. From repeated experiments they derived the theory that the elements are made up of minute, indivisible particles that cling together in groups whenever elements combine in compounds. These minute particles were called *atoms* (from the Greek for *not divided*) by John Dalton, an English chemist, who formulated the atomic theory as a scientific law early in the nineteenth century. It

is true that the ancients also conceived of matter as being discontinuous—made up of invisible, indivisible grains—but with them the hypothesis was purely speculative, and they made no attempt to prove or disprove it by experiment. The idea of the discontinuity of matter was forgotten or abandoned during the Middle Ages, was revived by Descartes and Boyle in the seventeenth century, and as formulated by Dalton became the foundation stone of modern chemistry. See **ATOMIC THEORY**, for a complete statement of this theory.

Structure of the Atom. While the progress of chemistry is greatly indebted to Dalton's theory, our conception of the atom and its properties has undergone striking modification by reason of the newer knowledge concerning electricity and the study of radioactivity. Atoms are no longer regarded as the ultimate, indivisible particles of matter, but are known to be composed of still smaller particles, and, under certain conditions, to be capable of



AN ALCHEMIST OF OLD IN HIS LABORATORY

being split up. The minute constituents of the atom are units of electricity, originally called *electrons*. In more recent nomenclature, particles representing negative electricity are known as electrons, while those representing positive electricity are called *protons*. (Some writers, however, prefer the names *negative* and *positive* electrons.)

The theory of atomic structure most generally accepted is that the atom is a miniature solar system consisting of a central nucleus analogous to our sun, with several electrons revolving about it in planetary orbits, at high velocities. The nucleus of the hydrogen atom, the simplest and lightest of all atoms, consists of a single proton; about it revolves one planetary electron. It is now accepted as a scientific fact that the proton, in whatever element it is found, is identical with the hydrogen nucleus. In

the nuclei of more complex atoms, there are four or more protons associated with a smaller number of electrons. In the heaviest atom, that of uranium, there are 238 protons. Protons are only found in the nuclei; electrons are also found there (except in the hydrogen atom), as well as in the space outside.

In a neutral atom, one not electrically charged, the number of protons is exactly equal to the sum of the nuclear electrons and the revolving electrons. A neutral helium atom, for instance, has four protons in the nucleus, two nuclear electrons, and two revolving electrons. Unlike kinds of electricity attract each other. Since every proton has an electric charge equal to the charge of any electron (though unlike in kind), the helium nucleus has a net positive charge of two, the difference between the number of protons and nuclear electrons. But this nuclear charge of two is neutralized by the negative charge of two units derived from the two revolving electrons. An atom becomes negatively charged by receiving additional electrons, and positively charged by losing electrons. Such charged atoms are known as *ions*. Chemical activity depends upon these facts.

We are indebted to the English physicist Sir Ernest Rutherford for the generally ac-

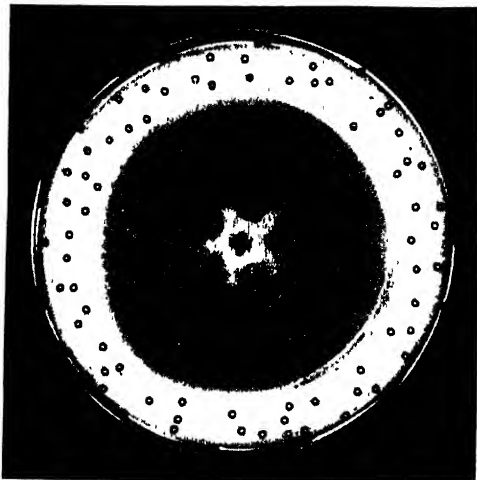
cepted theory of nuclear structure. The proton is believed to be about 1,845 times as massive as the electron, and to have a radius approximately that much less than the radius of the electron. That is, the proton is incon-

ceivably minute, but relatively is very dense and heavy; in the nucleus of any atom practically all of the mass or weight of the atom is centered. The supposed relative sizes of these units can be made clearer by the following comparison: If the hydrogen atom were enlarged until the electronic orbit were equal in size to that of the earth, the electron would have a diameter of 6,900 miles, while that of the proton would be less than four miles. In respect to size, then, the atomic nucleus is not analogous to our sun, but it is in density.

These statements are all the more startling when we remember the infinitesimal

size of the atom itself. On the surface of an ordinary pinhead there are over two quadrillion atoms. Furthermore, the external electrons revolve in orbits that relatively are as far from the nucleus as the planetary orbits are from the sun. The space in the atom, in other words, is as empty as astronomical space. Of course, these minute sizes and distances are beyond human comprehension. In attempting to visualize them, the imagination is as baffled as when the mind strives to picture the vast sizes and enormous distances with which the astronomer has to deal.

Atoms and Molecules. The next step in the structure of matter is the combining of atoms to form molecules. Molecules may be defined as the smallest particles of any substance existing in a free state. A molecule of an element consists of one, two, or more atoms of the same substance. A molecule of hydrogen, for example, consists of two atoms of hydrogen in chemical combination. A compound, on the other hand, is an association of molecules each one of which is made up of atoms of different substances. Water is a compound of hydrogen and oxygen. Each of its molecules consists of two atoms of hydrogen and one atom of oxygen. A molecule of water resolved into its constituents ceases to be water. Therefore, there is no



REPRESENTATION OF AN ATOM

An atom of matter is composed of electrons which form a miniature solar system. There is a center nucleus of positive electricity, around which whirling electrons rotate at incredible speed. It would be impossible to hazard a guess as to the number of times the above representation has been magnified above the size of an atom in order to present the electron theory.

such entity as an atom of water. In ordinary chemical reactions, atoms are not further decomposed, but this does not mean that they cannot be. The study of radioactive elements has taught us that the atoms of these elements are breaking up spontaneously by natural processes.

The Elements

The theory that atoms are indivisible is closely connected with the idea that elementary substances cannot be decomposed into simpler substances nor resolved one into another. This latter theory was derived, naturally enough, from the failure of chemists to decompose such substances by any methods at their command. It is still agreed that there are a few dozen substances—ninety-two, to be exact—that resist all ordinary chemical reactions. Of these elements, all but two have been discovered (see table on page 1332). It is the radioactive elements that have disproved the theory that elements are universally stable. Radium, discovered by the Curies in 1898, is one step in a long process of disintegration through which uranium, after billions of years, changes into a substance resembling lead. The chemical process here involved is a breaking-up of the nuclei of atoms, once considered indivisible. But man cannot alter, hasten, or diminish the rate of disintegration, and so our statement that elements are substances that cannot be decomposed by ordinary chemical reactions holds good. (The subject of RADIOACTIVITY is explained more fully elsewhere in these volumes. See, also, in this article, the section on *Transmutation of Elements*.)

Isotopes. Dalton's atomic theory states that all the atoms of a given element have the same weight. As commonly used, *atomic weight* does not mean the actual weight of an atom (such as fraction of a gram), but the relative weight of one atom compared with the atom of another element taken as a standard. Chemists have selected oxygen (atomic weight 16) as the standard upon which to base all atomic weights (see ATOMIC WEIGHTS, for detailed explanation of how atomic weight is calculated). The unit of the system of atomic weights is thus the sixteenth part of the atomic weight of oxygen. When we say, for instance, that the atomic weight of helium is 4, we mean that the helium atom is $\frac{1}{4}$, or $\frac{1}{16}$, as heavy as the oxygen atom. One of the many important discoveries resulting from the study of radioactive elements is that several elementary substances can have identical chemical properties but different atomic weights, an apparent contradiction of Dalton's theory. Such substances are known as *isotopes*.

While radioactive isotopes were the ones first identified, subsequent research proved that

many ordinary elements are mixtures of isotopes. Chlorine, with atomic weight 35.46, is known to be a mixture of two other chlorines having atomic weights 35 and 37. The weight 35.46 represents the average weight of the isotopic atoms in the proportion in which they occur in nature. Bismuth has four radioactive isotopes; thorium has more. Carbon and oxygen also have isotopic forms.

A question may occur to the reader at this point. If there are so many different isotopic elements, is it correct to say that there are only ninety-two elements? We can answer this question by saying that there are really ninety-two kinds of elementary substances, divided into two classes. The *simple* elements are those that consist of but one kind of atom, and the *mixed* elements are those formed by a mixture of several simple elements. With this distinction in mind, the reader should have no difficulty in interpreting the meaning of the term *element* as used in subsequent paragraphs.

The Periodic Law. The nineteenth-century chemists discovered certain important relationships among the elements, and in 1871 the Russian chemist Mendeleev published an exposition of the law underlying these relationships. This law he stated as follows:

All the properties of the elements vary as a periodic function of their atomic weights.

This means that when the elements are arranged in the order of their atomic weights, they show a periodic recurrence of properties, like properties being repeated at regular intervals. Mendeleev's table became the model for all subsequent tabulations. He included in it the sixty-three elements known in his day, and left gaps for the elements still to be discovered. It is further to his credit that he correctly foretold the discovery of three of these elements and forecast their properties.

Atomic Number vs. Atomic Weight. It was long a puzzle to chemists that when the elements were grouped according to recurring properties, the order of atomic weights was reversed at certain places in the periodic table. Some other determining factor was surmised to exist. When the nuclear theory of atomic structure was announced, it was suggested that there was a definite relation between the net positive charge on the nucleus and the position of the element in the periodic table, that is, the number representing its order in the series when all the elements were arranged according to properties. Henry Moseley, a brilliant young English physicist whose career was ended by the World War, investigated the X-ray spectra of a number of elements, each of which he bombarded with streams of electrons. Any element so excited emits a characteristic radiation consisting of two series of X-rays of very great intensity. Each of these series has definite wave-lengths, and, as Moseley discov-

ered, they are such that certain numbers are inversely proportional to the square roots of the wave-lengths. These numbers vary by unity as we pass from one element to the next, and they have been found to be identical with the ordinal positions of the elements in the periodic system. In other words, it is the atomic number and not the atomic weight that is the real basis of the periodic law.

The atomic number of any element is the number representing the excess of protons over electrons in the nucleus of the atom. Protons and electrons do not vary in character from atom to atom, but their arrangement varies in atoms of different substances. The hydrogen atom, with one proton and one electron, is probably the "common stuff" of matter. The elements are merely hydrogen atoms in different combinations, according to the modern theory. With the exception of properties depending on mass and radioactivity (or stability), the ordinary physical and chemical characters that distinguish any element are determined by the number and arrangement of its planetary electrons. But the number, relative positions, and velocities of these electrons are controlled by the *nuclear charge*, the net positive charge on the atomic nucleus. The atomic number, therefore, is the true index of the properties of an element.

The atomic weight, on the other hand, indicates the number of protons in the nucleus, and is called the *mass number* of the atom. The reader will recall that the weight or mass of any atom is centered in the protons, which are always found in the nucleus. Theoretically, the oxygen atom with weight 16 should be 16 times as heavy as the hydrogen atom, with its one proton. Actually, hydrogen has atomic weight 1.008; that is, the uncombined hydrogen proton is heavier than a proton in combination. In other words, the combined weight of the 16 protons in the oxygen atom is slightly less than 16 times the weight of the free hydrogen proton. (If a hydrogen standard of 1 should be used, the atomic weight of oxygen would be 15.88.) Chemists explain this loss of weight by assuming that when protons combine with electrons to form nuclei of more complex elements, the close packing of positive and negative units of electricity causes a small though actual loss of mass, indicated by loss of weight, which increases proportionately as the atoms grow heavier. The rule still holds, however, that the atomic weight (expressed in whole numbers) gives the number of positive units in the nucleus.

The foregoing paragraphs should make it clear why the different isotopes of an element have the same chemical properties but different atomic weights. Take, for example, the forms of chlorine. There are two isotopes—chlorine weight 35, and chlorine weight 37. The first

has an atomic nucleus with 35 protons and 18 electrons. The nuclear charge is thus +17, and there are 17 planetary electrons. The second has an atomic nucleus with 37 protons and 20 electrons. Its nuclear charge is also +17, and again there are 17 external electrons. Ordinary chlorine also has a nuclear charge of +17, but its atomic weight of 35.46 represents, of course, the average weight of its isotopic atoms. All three chlorines have the same chemical properties, the same nuclear charge, the same system of external electrons, and the same atomic number, 17. The varying atomic weights of the isotopes indicate that their nuclei are of *different construction*, the heavier having the greater number of protons. In the determining of *properties*, the atomic weight is thus a secondary factor.

Table of Elements. The following table contains the names, symbols (see subhead *Chemical Symbols*, below), atomic weights (where known), and atomic numbers of the ninety elements so far discovered. Numbers 85 and 87 are still missing.

NAME	SYMBOL	ATOMIC WEIGHT	ATOMIC NUMBER
Actinium	Ac	226. (?)	89
Aluminum	Al	26.97	13
Antimony	Sb	121.77	51
Argon	A	39.91	18
Arsenic	As	74.96	33
Barium	Ba	137.37	56
Bismuth	Bi	209.00	83
Boron	B	10.82	5
Bromine	Br	79.916	35
Cadmium	Cd	112.41	48
Caesium	Cs	132.81	55
Calcium	Ca	40.07	20
Carbon	C	12.000	6
Cerium	Ce	140.25	58
Chlorine	Cl	35.457	17
Chromium	Cr	52.01	24
Cobalt	Co	58.94	27
Columbium	Cb	93.1	41
Copper	Cu	63.57	29
Dysprosium	Dy	162.52	66
Erbium	Er	167.7	68
Europium	Eu	152.0	63
Fluorine	F	19.00	9
Gadolinium	Gd	157.26	64
Gallium	Ga	69.72	31
Germanium	Ge	72.60	32
Glucinum*	Gl	9.02	4
Gold	Au	197.2	79
Hafnium	Hf	178.6	72
Helium	He	4.00	2
Holmium	Ho	163.4	67
Hydrogen	H	1.008	1
Illinium	Il	..	61
Indium	In	114.8	49
Iodine	I	126.932	53
Iridium	Ir	193.1	77
Iron	Fe	55.84	26
Krypton	Kr	82.9	36
Lanthanum	La	138.90	57
Lead	Pb	207.20	82

* Also known as Beryllium, Be

CHEMISTRY AIDS COMMERCE

Chemical knowledge has multiplied the strength of steel

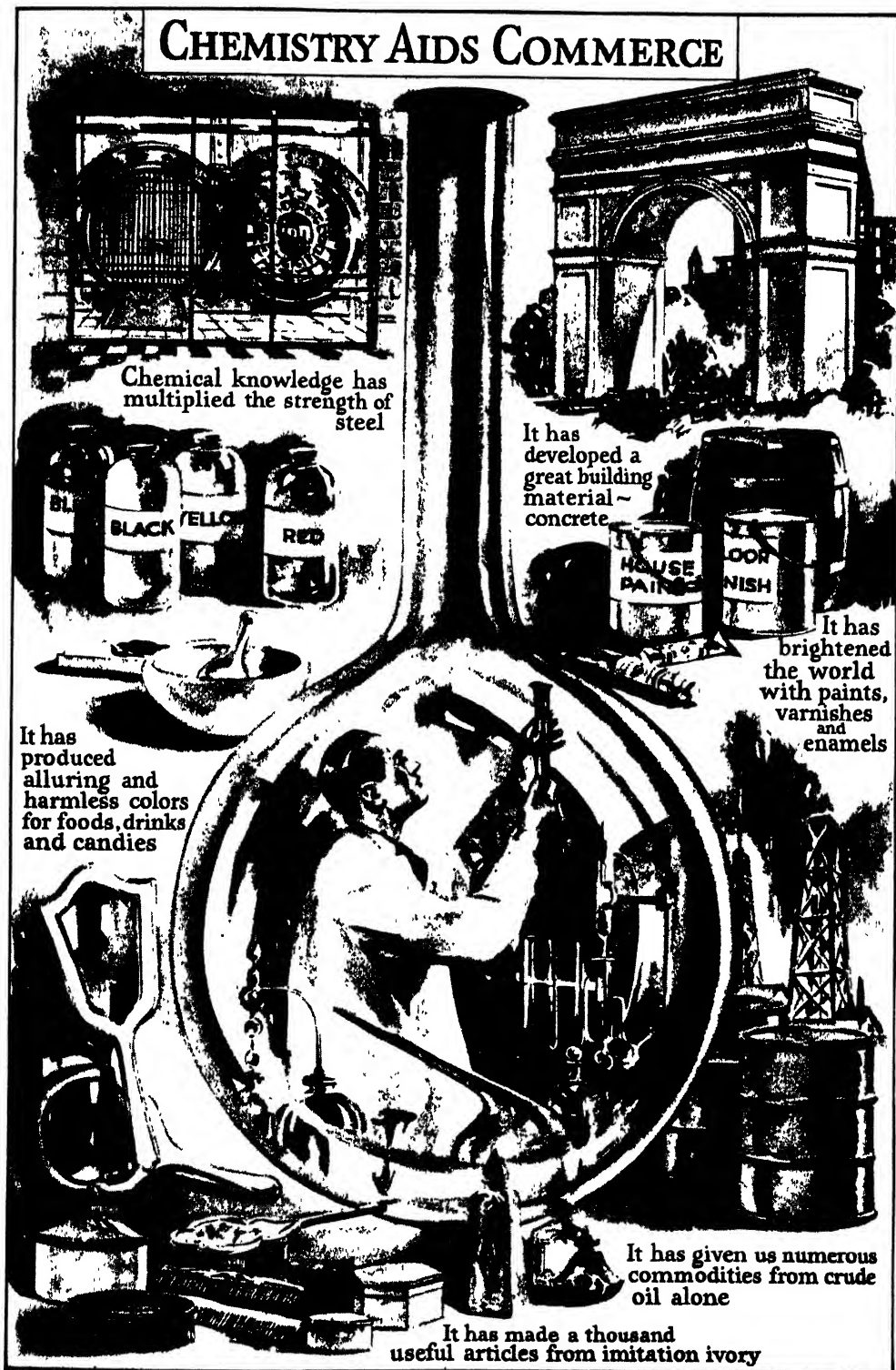
It has developed a great building material ~ concrete

It has brightened the world with paints, varnishes and enamels

It has produced alluring and harmless colors for foods, drinks and candies

It has given us numerous commodities from crude oil alone

It has made a thousand useful articles from imitation ivory



NAME	SYMBOL	ATOMIC WEIGHT	ATOMIC NUMBER
Lithium	Li	6.940	3
Lutecium	Lu	175.00	71
Magnesium	Mg	24.32	12
Manganese	Mn	54.93	25
Masurium	Ma	.	43
Mercury	Hg	200.61	80
Molybdenum	Mo	96.0	42
Neodymium	Nd	144.27	60
Neon	Ne	20.2	10
Nickel	Ni	58.69	28
Nitrogen	N	14.008	7
Osmium	Os	190.8	76
Oxygen	O	16.000	8
Palladium	Pd	106.7	46
Phosphorus	P	31.027	15
Platinum	Pt	195.23	78
Polonium	Po	210	84
Potassium	K	39.096	19
Praseodymium	Pr	140.92	59
Protoactinium	Pa	230 (?)	91
Radium	Ra	225.95	88
Radon†	Rn	222.	86
Rhenium	Re		75
Rhodium	Rh	102.91	45
Rubidium	Rb	85.44	37
Ruthenium	Ru	101.7	44
Samarium	Sm	150.43	62
Scandium	Sc	45.10	21
Selenium	Se	79.2	34
Silicon	Si	28.06	14
Silver	Ag	107.880	47
Sodium	Na	22.997	11
Strontium	Sr	87.63	38
Sulphur	S	32.064	16
Tantalum	Ta	181.5	73
Tellurium	Te	127.5	52
Terbium	Tb	159.2	65
Thallium	Tl	204.39	81
Thorium	Th	232.15	90
Thulium	Tm	169.4	69
Tin	Sn	118.70	50
Titanium	Ti	48.1	22
Tungsten	W	184.0	74
Uranium	U	238.17	92
Vanadium	V	50.90	23
Xenon	Xe	130.2	54
Ytterbium	Yb	173.6	70
Yttrium	Y	88.9	39
Zinc	Zn	65.38	30
Zirconium	Zr	91	40

† Also called niton, Nt

Transmutation of Elements. In the disintegration of radioactive elements, we have nature's method of transmuting elements. The alchemists who sought to change the baser metals into gold were seeking the key to some such process, and now, after many centuries, chemists are again at work on this fascinating problem. The radiations sent out in radioactive processes are of three kinds, called *alpha*, *beta*, and *gamma* rays. The alpha rays are streams of positively charged helium atoms; the beta rays are streams of electrons moving with almost the velocity of light; and the gamma rays are identical with light rays of very short wave-length. Some radioactive ele-

ments radiate all three rays; others give off one or two.

Once the nature of these radiations was ascertained, transmutation by artificial means was theoretically possible. It could be brought about by causing a proton, an alpha particle, or an electron to enter or leave the nucleus of an atom, for such modification of the nucleus would change the nuclear charge, and so the identity of the atom. For example, if a proton could be ejected from the mercury nucleus (atomic number 80), the nuclear charge would be decreased by one unit, and the atom would be transmuted into gold (atomic number 79); or the same result would follow if an electron were caused to enter the mercury nucleus.

There is considerable evidence that actual transmutation of elements has finally been accomplished. Lead is reported to have been transmuted into mercury by means of a strong electric current. Professor Miethe of Germany is convinced that he has produced gold from mercury. Sir Ernest Rutherford has had definite results in experiments with nitrogen and some of the other lighter elements. By bombarding the atoms of these elements with alpha particles emitted from radium C, he caused the ejection of protons (hydrogen nuclei) that eventually became neutral hydrogen atoms through the capture of planetary electrons. All such transmutations are on so minute a scale that as yet only theoretical interest attaches to them. It is known that tremendous amounts of energy lie locked in the atoms, and if men could effect transmutation on a large scale and release this energy, they would have power to work miracles undreamed of now. But should this energy be released and should it be found uncontrollable, it would undoubtedly blow our planet into fragments.

Quantum Theory. The planetary electrons are believed to revolve about the nucleus in elliptical orbits arranged in different planes. In 1913 the Danish physicist Niels Bohr announced a new conception of the relation between these revolving electrons and the energy which they emit. This theory may be described as an application of the older *quantum theory* (which see) to the structure of the atom. By quantum (plural, *quanta*) is meant the amount of energy liberated when a planetary electron jumps from one orbit to another. Bohr suggests that the atom of any element has a fixed number of orbital paths in which the planetary electrons may move, and that there is a particular and invariable speed for each orbit. The electron does not emit energy while moving around the nucleus, but only when it jumps from one orbit to another, or when knocked out of the orbital paths altogether. The quantity of energy emitted in a given position has a definite value, which can neither be diminished nor increased. This theory as-

sumes that the orbit of an electron is a series of different positions, not a continuous line, and that the radiation of energy is a discontinuous process. Professor R. A. Millikan has stated that the spectroscope is furnishing "as exacting proof of the orbital theory of electronic motions as the telescope furnished a century earlier for the orbital theory of the motions of heavenly bodies."

Chemical Compounds

If a small quantity of very fine iron filings be mixed thoroughly with a small quantity of powdered sulphur, the iron remains iron and the sulphur remains sulphur. They may be distinguished from each other when looked at through a microscope, and a magnet held over the mixture will quickly draw out the iron, leaving the sulphur. But if the mixture is placed in an iron spoon (or a glass test tube) and held over a hot flame, something is formed which is neither iron nor sulphur—which is not like either iron or sulphur. The new substance may be pounded to a powder, but no magnet, however strong, can now draw out the iron, for the simple reason that, as iron, it is not there. The new substance is just as real and has just as distinct properties of its own as had the two elements which combined to make it, but there is one difference. Any person who knows the proper chemical means for decomposing the new substance could reduce it again to iron and sulphur, while no ordinary chemical process could have divided either of the original elements.

The iron and sulphur before they were heated formed what is known as a *mechanical mixture*, each keeping its own properties; after they were heated they formed a *chemical compound*. Many of the very commonest things, which seem as simple as anything could well be, are really chemical compounds. Water and salt, for example, are of this nature. Air, on the other hand, is a mere mechanical mixture of gases.

There are definite ways in which chemical compounds are made up. When a certain number of atoms of one element are brought close to atoms of another element, various things may happen. They may remain exactly as they have been, neither substance showing the slightest interest in the other; one atom of one kind may seize upon one or more atoms of the other kind and unite with them to form a tiny particle of a new substance—a *chemical compound*; or both kinds of atoms may wait until some force, as heat or electricity, puts them in such a condition that they can unite.

Atoms which will thus unite with each other, either with or without aid, are said to have a *chemical affinity* for each other, and unless two substances have such affinity they cannot be forced to unite. No amount of mixing or melt-

ing or heating will make of them **anything** but a mechanical mixture. In the experiment described above, the sulphur and iron filings united to form a new substance with properties of its own, not just because they were melted together, but because they also have a **chemical affinity** for each other.

In the very simplest form of a chemical compound, one atom of one substance unites with one atom of another. But often one atom of one element will seize upon two or three or even four of another, or two atoms of one may combine with three of another. It is easier for some elements to enter into combination than for others, because some elements are gases and some are solids, and the latter are much more dependent on outside forces to make it possible for them to unite with substances for which they have even the strongest chemical affinity.

From the standpoint of the new chemistry, chemical combination is explained in terms of electronic activity. Briefly, such power of combination is believed to be the ability of the atom to attract one or more electrons from another atom, or to yield electrons to such an atom. The movements of electrons outside the nucleus are supposed to effect chemical changes; more particularly, those in the outer orbits, which chemists call *valence electrons*. The theory is that the external electrons are arranged in so-called *spheres*, or *shells*, and that the valence electrons are in the outermost shell. The inert elements, those that do not enter into chemical combination, have no valence electrons. As the atomic numbers of the elements in the periodic table increase by unity, the number of valence electrons held in the outside shell increases from 0 to 7. For example, starting with helium (no valence electron) we have the following series: helium (0), lithium (1), glucinum (2), boron (3), carbon (4), nitrogen (5), oxygen (6), fluorine (7). Following fluorine in the table is neon, another inert element (with no valence electron). It begins another series with valence electrons increasing by 1 until chlorine is reached, with 7 valence electrons. The recurrence of properties at regular intervals is thus explained.

Chemical activity depends upon the valence electrons. The nucleus and remaining external electrons are said to form the *kernel* of the atom, and are thought to be beyond the reach of reagents. Chemical combination differs from transmutation in that transmutation involves a breaking up of nuclei. So long as the nucleus remains intact, an atom which has undergone chemical combination may be reconstituted.

Chemical Symbols. It is customary to assign to each element a symbol representing an abbreviation of its common or Latin name. Examples are *O* for oxygen, *N* for nitrogen, *Li*

for lithium. The chemical compounds also are known by symbolic names. These indicate the elements of which the compounds are composed, and the number of atoms of each element entering into the combination. By this simple system, the symbols of the elements which make up a substance are written together as a *formula*, thus— NaCl . Na stands for sodium, the Latin name for which is *natrium*, and Cl for chlorine, and the substance declares itself at once as a compound of sodium and chlorine—a compound for which the common name is salt.

In this instance, one atom of sodium combines with one atom of chlorine, but in cases where the number of atoms is not thus equal, figures must be used. These figures are made small and are written to the right of and below the letters, thus— O_3 , which means three atoms of oxygen, combined into one molecule of ozone. Water is made up of hydrogen and oxygen, two atoms of hydrogen uniting with one of oxygen, and the formula is therefore H_2O .

Branches of Chemistry

The two great branches into which chemistry is divided are commonly known as *organic* and *inorganic* chemistry. The names may not be the best that could be devised, but they have been used so long that there is no thought of change.

Organic chemistry is that division which treats of the *carbon* compounds. Hundreds of compounds of this element are found in living organisms—plants and animals—and indeed no living thing is known which does not contain carbon compounds. In the early days of chemical study, it was believed that all the so-called organic substances existed in living plants and animals only—in other words, that they could be produced only in living organisms. But in 1828 a chemist produced in his laboratory an organic compound, called *urea*, from its elements, and later, others were produced artificially until the theory of a *vital principle* was given up. This branch is thus better described as the chemistry of the carbon compounds.

Inorganic chemistry treats of those compounds which do not have carbon in their make-up. The dividing line is not, however, quite sharp, because carbon itself and some carbon compounds, especially those which are found as minerals, are commonly discussed in books on inorganic chemistry.

Other special classifications exist, according to the differing purposes of chemical study, as follows:

Biochemistry, or *physiological chemistry*, treats of the chemical changes which take place in living plants and animals. See BIOCHEMISTRY.

Agricultural chemistry deals with the problems of the farm and farm products. Although

of comparatively recent development, it has already assumed great importance. See AGRICULTURE.

Industrial chemistry treats of the application of chemical knowledge to the manufacturing of products. These two last-named branches are divisions of *applied chemistry*. T.B.J.

Contributions of Chemistry to Human Welfare

Concerned with the ninety-two elements and their thousands of combinations that make up the universe and the world, the chemist has the possibility of remaking the conditions of life. Dozens of new substances—drugs, dyes, textiles, foods, fuels, and chemicals—have been created by the skill and thought of the chemist and his associated scientists. Nature, master chemist herself, has been surpassed and outdone time and time again, although it is true that human knowledge has not penetrated or duplicated some of the syntheses and other chemical processes that make possible the cycle of life. The complete mechanism of photosynthesis—the changing of the carbon dioxide of the air and the water of the soil into the starches and cellulose of growing plants—has not yet been discovered, though much has been learned.

Chemistry is more than the mere use of materials. A barbarian can perform a chemical reaction, the making of carbon dioxide and water out of wood and oxygen, by the simple process of kindling a fire; but only a chemist can make artificial silklike material out of wood. Lightning can set fire to oil wells and obtain heat from the liquid fuel created by the chemical conversion of ancient organic matter during long geologic ages; but chemistry is necessary to make gasoline out of crude oil, or, as is now possible, oil out of coal.

In a single generation, chemists have begun to change the complexion of industry. Hardly a factory has remained unaffected by the new chemistry; every life has felt its influence; comforts and necessities that no king could have had in olden days are now within the reach of all.

Fuels, foods, raw and finished materials, drugs, metals, and many other commodities have passed through revolutions or are about to change under the influence of the discoveries of chemistry.

Coal and oil are synonymous with fuel in the minds of most people. The time is coming when the burning of raw coal and crude oil will be looked upon as practically criminal. From coal it is possible to obtain thousands of products as far removed from the dirty black smudge of bituminous carbon as the rainbow is from night. Mere burning of coal in the furnace gives the three essentials of the great coking industry that, though young and quite

CHEMISTRY FIGHTS DISEASE *and* CRIME



Modern diagnosis depends largely on the chemists findings

Foods have been made more nourishing and palatable

Chemical science is the background of drugs and medicines

Many police and crime problems

are solved by chemical science

modernistic compared with burning coal for power, promises to be superseded by the new coal processes that are now growing up in Europe. From the coal fire there arises gas, quickly burned, that is given off when the coal is heated. With it is also burned black, sticky tar, ill-smelling and despised until the chemist discovered a thousand dyes, drugs, flavors, and other chemicals hidden within its molecules. The spongy mass left behind is coke, the skeleton of coal, so useful in making iron and steel and acceptable as a household fuel. Destructive distillation of coal within air-free retorts prevents the gases from burning, allows them to be washed to remove the valuable ammonium sulphate they contain, and then permits them to be piped to engines for power, or to cookstoves for heat. The oily and tarry matter condenses out of the gas, to be used in making carbolic acid, moth balls, benzene, toluene, anthracene, and other products, some of them halfway to the dyes that make this a brighter world to live in.

Oil has revolutionized the transportation of the country; it drives merchant vessels and warships, warms houses, and provides power for factories. A world without liquid fuel would be unthinkable and unlivable to-day. The earth has provided lavishly a ready-made liquid fuel in the crude oil that flows out of wells at the rate of some 900,000,000 barrels a year. The chemist steps in to aid the oil industry to supply light motor fuel out of the heavy petroleum that nature provides. Cracking, a process in which thick oils are broken into thin, supplies a third of the gasoline that runs our automobiles (see PETROLEUM).

The day is coming when the earth will provide no more oil. Germany and the rest of Europe are already afflicted with high-priced liquid fuel. It is natural that European chemists should have faced the problem of making liquid fuel from something besides petroleum. The German Bergius has liquefied coal by pulverizing it and heating it with hydrogen at high temperature and high pressure. From the resulting oil and tar he has produced motor fuel, Diesel oils, lubricants, and heavy fuel oil at the rate of over a hundred gallons per ton of coal. Another German, Fischer, produces gaseous, liquid, and solid hydrocarbons from water gas, the gas made from coal and water. Patart, a French chemist, has also perfected a process for converting water gas into acids, alcohols, and numerous other complex and useful chemicals.

Wood alcohol has received its greatest publicity in connection with those bibulous unfortunates who mistook it for its sister chemical, ethyl alcohol. But methanol, as the chemists prefer to call wood alcohol, is an important chemical in the manufacture of many products, notably the new synthetic resins that enter

into our radio sets, automobiles, and houses. Most of these new man-made resins, the most famed of which is *bakelite*, are the combination of two chemicals. Bakelite is made of two disinfectants, formaldehyde and phenol, better known as carbolic acid (see BAKELITE). Methanol enters into the picture because formaldehyde is made from it. Until a few years ago, every drop of methanol used meant the destruction of hardwood, but now synthetic wood alcohol is made not from wood but from carbon monoxide and hydrogen, both derived from coal. Urea is now used to replace the phenol in making a synthetic resin that may rival glass itself. Even urea is now made from the hydrogenation of coal and air, and it is being used as a fertilizer as well as a raw chemical material. Since urea was the organic chemical whose synthesis inaugurated the chemist's imitation of compounds hitherto believed nature's exclusive property, it is not surprising that it is being built up out of cheap atomic units.

There was a day when wood was simply wood, just as coal was coal. In those days wood was used for houses, furniture, and even for newspapers, but to-day wood makes not alone the things into which it enters in its natural state; it paints automobiles, makes silk-like stockings and underwear, coats sausages, substitutes for the hides of animals, and even rivals window glass. The constituent of wood that is valuable for these uses is cellulose (which see), one of the world's fundamental complex materials. Cellulose grows in cotton fiber, cornstalks, and in all other woody plants, as well as in trees. So the supply is practically unlimited.

The silkworm's rivals, rayon and the other so-called artificial silks, have created a large new textile industry. Some 390,000,000 pounds of this cellulose product are now being made yearly to clothe those who cannot afford real silk and who want something prettier than calico. Rayon labors under a stigma from having been offered as a substitute for silk. In reality, it is a new textile, worthy of a place and name all its own. Cellulose, in the form of wood fiber or the short, cheap shreds from cottonseed, called linters, is dissolved in various ways, then precipitated after being passed through minute holes like so much solid spaghetti. The trick is to take one form of cellulose and so change it by dissolving and handling that it takes the shape of yarn suitable for spinning into cloth. The original process nitrates the cellulose, and the resulting product would be guncotton if the process were carried a bit further. In another method, the cuprammonium silk process, the cellulose is dissolved in ammoniacal copper solution, while viscose uses soda lye and carbon disulphide. Celanese is first cousin to the non-inflammable motion-picture film, as it is made by the acetate process.

Rayon and the other synthetic cellulose textiles do not clothe human beings alone. Sau-sages wear a skin of viscose during manufacture in a new process that allows the consumer to eat skinless frankfurters instead of those enclosed in natural casing. *Fabrikoid*, the cellulose film famous as an artificial leather, also makes manufacturers independent of animal products. To use real leather for all the purposes to which this material is put, twice as many cattle as ever existed in America at any one time would have to be slaughtered. Candy and other tempting dainties now wear a show-case dress of transparent cellulose film, called *cellophane*. Thicker sheets of a similar material compete with glass in some uses.

A revolution of the paint-and-varnish industry has begun through the use of cellulose lacquers. Born of the necessity of finishing automobiles in twenty-four hours instead of twenty-eight days, as was the practice in the paint-and-varnish days of automobile finishing, cellulose lacquers are invading the fields of oil paints and varnishes, indoors and out.

Wood pulp in its own right is finding many uses. And the waste cellulose of sugar cane (bagasse) now is made into artificial lumber. Wall board is being made from cornstalks and sawdust, and, after being hydrolyzed to change its starches to sugar, has been fed to cattle.

Freedom from the food monopoly exercised by the long-accepted farm-and-ranch sources of foodstuffs is promised by the chemist. The sugar cane and sugar beet have rivals in corn and the Jerusalem artichoke. From the starch of common corn there are now being made thousands of pounds of corn sugar, or, to use other names, glucose and dextrose. From the despised artichoke there can be obtained a sugar, called *levulose*, that is fifty per cent sweeter than the sucrose of cane and beet sugar. Levulose is not yet available commercially, but it will soon be on our dinner tables.

Fats from oils, a chemical achievement that involves the hydrogenation of the oil in the presence of a catalyst, promise to give edible fats to the larder without the aid of the pig or cow. Cottonseed oil by this method can be turned into solid fat, thus converting a low-cost material into a more expensive one.

The chemist even manufactures vitamins. When ultra-violet light is allowed to shine on ergosterol, the effect of Vitamin D, which prevents rickets, seems to be produced.

Meat as a source of protein food is still the standard, but chemists are anticipating a day when increasing population will make it more difficult for all of us to live in comparative plenty. It is estimated that a hundred pounds of foodstuffs are required to produce three pounds of beef, and that a given area can support five times the population if the protein foods are obtained from sources other than

meat. Yeast, popularized in the public mind as a source of one of the vitamins, may be the new meat of the future. Yeast can grow quickly on waste products; large quantities can be produced in limited space. Properly seasoned, yeast might be made as palatable as beefsteak.

To make agriculture more efficient, fertilizers must be used on a larger scale than ever before. The three soil foods are phosphate, nitrogen, and potash. Phosphate is to be had in abundance in the phosphate rocks of Florida and elsewhere. Potash has largely been a monopoly of the German beds of that mineral, but test drillings in Texas show that similar minerals underlie parts of that state. Chile, until the World War, had a monopoly on the production and sale of nitrates which nature had deposited on her deserts and nowhere else in quantity. The air is three-fourths full of nitrogen, and the chemist has succeeded in fixing this free and uncombined nitrogen of the air so that it can be used by plants, for explosives, and for other productive commodities. The first successful method of extracting nitrogen from the air was the flashing of powerful electric arcs to cause small quantities of the nitrogen and oxygen of the air to unite. This arc process is now in use extensively only in Norway, where power is cheap. The most modern method, the one used by the Germans during the World War to supply their armies with explosives, is the synthetic-ammonia process, in which nitrogen and hydrogen gas are made to combine to form ammonia.

Another gas of the air, carbon dioxide, which is a product of combustion, has come into a new industrial application. Solidified in the form of carbon-dioxide snow, it is called *carbice*, or *dry ice* (see CARBICE). It produces cold without moisture, and there is no pan under the refrigerator to empty.

Synthetic rubber has been achieved, but there seems to be little danger that the rubber plantations of the East Indies will lose their monopoly in the near future. Artificial rubber has not been produced cheaply enough, and its quality is not equal to natural latex, the sap of the rubber tree. Rubber, thanks to the chemist's work on vulcanizing agents, has been made tougher, better, and longer-lived. Methods of electroplating with rubber have been devised.

Quartz, silicon dioxide, one of the earth's most plentiful materials, has been conquered and made into a superglass. Fused quartz allows the ultra-violet end of the spectrum to shine through where ordinary glass would be a barrier. Its cost has retarded its extensive use, but it has a future. Automatic machinery for glass bottle-blowing and sheet-glass rolling has revolutionized the glass industry. High-alumina portland cement, which gains in a day the usual cement's strength of a week, has

added a new building material to the tools of the engineer and architect.

Metals have contributed to modern industry largely in the last half-century, but new metal combinations and processes promise more advance in the future. Rust, red and destructive, has been the relentless enemy of iron and steel. The metal chromium, when added to the extent of twelve to fourteen per cent to iron or steel, will make it rustless and stainless. As junior partners of iron and steel, many other metals form partnerships that for many purposes are superior to existing irons and steels. Chromium as a coating on metals, electro-deposited, rivals and surpasses nickel. Where light weight and strength are required, aluminum alloys are available.

To pierce the dark and solid interiors of metals and other materials, the chemist has adopted the X-ray, a tool of the physicist. Flaws and blowholes can be detected in castings, just as holes can be seen in Swiss cheese. But the X-ray looks even deeper. It can see the very atoms of which the metal is composed. Atomic and crystal arrangement as revealed by the X-ray allows the actual designing of new metallic alloys.

Following in the paths of the great pioneers of synthetic chemistry who first showed that man's mind and skill could create element combinations unknown to nature, chemists have added to the world's synthetic drugs, medicinals, perfumes, and organic chemicals. Insulin, the hormone of the pancreas that prevents and cures diabetes, was analyzed after isolation by a chemist, and its composition determined. Dread African sleeping sickness is being fought with a new chemical descendant of Ehrlich's 606.

Even the poison gases used in the World War have found peace-time uses. Phosgene is necessary in the manufacture of violet perfume, and tear gas is used as a warning addition to deadly hydrocyanic-acid gas used in fumigating.

The chemist is not yet independent of nature, and he will always be limited by the materials the earth furnishes him. But he is becoming expert in picking things apart and putting them together again in different ways. A single plentiful raw material, like corn, wood, coal, or air, can make a multitude of useful materials. The chemist is increasing the factor of safety of living; he may enable future generations to be fed, clothed, and sheltered from a grain field, a coal mine, or the air and sunlight above them.

W.D.

Related Subjects. The articles in these volumes which have to do with chemistry are numerous. To make reference to them easy, the following index is given, which lists all of those closely related to the subject, except the elements. A list of those is given in the article above, and all of the important elements are treated in separate articles.

The reader who takes time to study the text matter of this list will have a good foundation knowledge of this very important and complicated subject:

Acetic Acid	Fire
Acetylene	Flux
Acid	Formaldehyde
Affinity	Fulmination
Air	Gas
Albumen	Greek Fire
Alchemy	Guncotton
Alcohol	Gunpowder
Alkali	Glauber's Salt
Alkaloids	Glycerine
Allotropy	Halogens
Alloy	Hydrates
Alum	Hydrocarbons
Alumina	Hydrofluoric Acid
Amalgam	Hydrogen Chloride
Amber	Hydrogen Peroxide
Ammonia	Iodoform
Analysis	Ion
Aniline	Kelp
Annealing	Lactic Acid
Antidote	Lime
Aqua Regia	Limelight
Assaying	Liquid Air
Atom	Litmus
Atomic Theory	Lunar Caustic
Atomic Weights	Magnesia
Base	Matter
Benzene	Metals (with list)
Benzine	Molecule
Benzoate of Soda	Natural Gas
Biochemistry	Nitrates
Blue Vitriol	Nitric Acid
Boneblack	Nitroglycerine
Borax	Nitrous Oxide
Brimstone	Oxalic Acid
Bromides	Oxidation
Calcium Carbide	Ozone
Carbide	Paris Green
Carbides	Pewter
Carbohydrates	Phosphates
Carbolic Acid	Phosphoric Acid
Carbonates	Picric Acid
Carbon Disulphide	Poison
Carbonic-acid Gas	Poison Gas
Carbon Monoxide	Potash
Carborundum	Prussic Acid
Catalysis	Ptomaines
Citric Acid	Putrefaction
Coal Tar	Quantum Theory
Colloids	Radioactivity
Combustion	Reactions
Corrosive Sublimate	Roentgen Rays
Cosmic Rays	Rust
Cream of Tartar	Sal Ammoniac
Creosote	Saltpeter
Crookes Tubes	Salicylic Acid
Cryolite	Smoke
Crystallization	Soda
Cyanogen	Soot
Decomposition	Stearic Acid
Dextrin	Stearin
Distillation	Sulphates
Dust Explosions	Sulphureted Hydrogen
Dyeing and Dyestuffs	Sulphuric Acid
Dynamite	Tannin
Electricity (with list)	Tartar
Electrochemistry	Tartaric Acid
Electrolysis	Verdigris
Explosives	Water
Fermentation	White Lead
Fire Damp	Wood Alcohol

CHEMISTS

Curie, Pierre and Marie S.	Gay-Lussac, Joseph I.
Davy, Sir Humphry	Liebig, Baron von
Faraday, Michael	Pasteur, Louis

OUTLINE AND QUESTIONS ON CHEMISTRY

Outline

I. What It Is

- (1) "The science of the composition of substances"
- (2) Its wonderful achievements

II. Its Development

- (1) Reasons for its beginning
- (2) Alchemy
 - (a) Its purpose
 - (b) Its methods
- (3) The real science
 - (a) Its connection with medicine
 - (b) Discovery of fundamental principles

III. Subject Matter

- (1) Divisions of matter
- (2) Made up of atoms
- (3) Structure of the atom
- (4) Atoms and molecules
- (5) The elements
 - (a) Definition
 - (b) Isotopes
 - (c) The periodic law
 - (d) Atomic number and weight
 - (e) Table of elements
 - (f) Transmutation of elements

- (g) Quantum theory
- (6) Chemical compounds
 - (a) Distinguished from mechanical mixture
 - (b) Chemical affinity
 - (c) Combination affected by outside forces
 1. Heat
 2. Electricity
 3. Light
 4. Mechanical force
 - (d) Combination explained in terms of electrons
 - (e) Chemical symbols
 1. Method of naming elements
 2. Method of naming compounds

IV. Branches of Chemistry

- (1) Organic chemistry
 - (a) The carbon compounds
 - (b) Not necessarily a study of living organisms
- (2) Inorganic chemistry
 - (a) Lack of sharp distinctions
- (3) Special classifications
 - (a) Physiological chemistry
 - (b) Agricultural chemistry
 - (c) Industrial chemistry

Questions

Name ten of the contributions of chemistry to human welfare.

Why is the study of chemistry of increasing importance to-day?

From the point of view of chemistry, what is the difference between air and water?

Mention two substances which are really compounds but seem like simple substances.

In the formula H_2SO_4 , what do the small figures indicate? What can you tell about the composition of the substance for which the formula stands?

What curious theory did old-time chemists hold as to the origin of disease?

What is meant by a "chemical compound"?

Give the chemical symbols for two inorganic substances commonly present on the dinner table.

What extraordinary relationships has chemistry discovered between substances that are apparently widely separated?

Why can brass be decomposed, while copper, which seems not unlike it, cannot be?

If you heat iron filings and sulphur in a test tube, can you then draw out the iron with a magnet?

What element, in some compound or other, is present in every living thing, so far as is known?

Under what conditions can elements be decomposed? What is an isotope?

How does the modern theory of the atom differ from Dalton's?

What is meant by atomic weight? Atomic number?

CHEMISTRY, BUREAU OF. See AGRICULTURE, UNITED STATES DEPARTMENT OF.

CHEMISTRY OF FOOD. See FOOD (Chemistry of Foods); NUTRITION.

CHEMNITZ, *kem' nits*. See GERMANY (Principal Cities).

CHEMULPO, *che mul' po*, CHOSEN, a port on the Yellow Sea, population 28,000. See CHOSEN.

CHENOPODIUM, *ke no'po' dih um*. See GOOSEFOOT.

CHEOPS, *ke' ops*, an Egyptian king of the fourth dynasty, builder of the famous Great Pyramid at Gizeh, near Cairo. He lived about 2000 B.C. According to Herodotus, the "Father of History," he was an oppressive ruler who stopped at nothing to secure funds to complete his pyramid, even sacrificing his daughter's honor. But other historians record their belief that he was considered a wise and powerful king. The Egyptians called him Khufu, and the pyramid "the glory of Khufu." It took twenty years and 100,000 men at labor constantly to complete this work of wonder. See PYRAMIDS.

CHEQUE, *chek*. See CHECK.

CHEPHREN. See PYRAMIDS.

CHERBOURG, *shehr boor'*. See FRANCE (Interesting Cities).

CHEROKEE. See INDIANS, AMERICAN.

CHEROOT. See TOBACCO.

CHERRY, a small stone fruit, one of the most popular tree fruits grown in home gardens. Because the birds are very fond of cherries and drop the seeds far and wide, cherry trees grow wild in all countries where they are planted. Either wild or cultivated, the trees are ornamental, with their satiny brown bark against the oval, dark-green leaves, dotted here and there with bunches of light, bright-red, or purplish-black fruit, feasts for birds as well as food for man.

Before the leaves come, the wealth of white blossoms make the trees seem "covered with

lightest snow." And who has not heard of, and in his mind's eye seen, the graceful branches of dainty pink cherry blossoms of Japan at Cherry Festival time—trees so covered with soft bloom it would seem some fleecy pink clouds must have dropped down at sunset time!

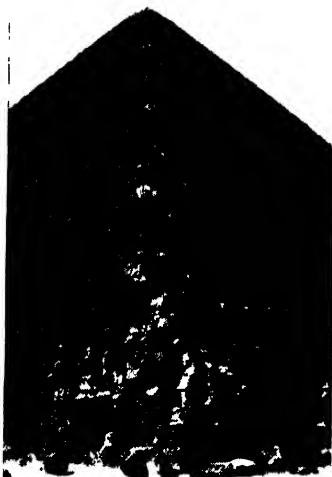
Cherries are now cultivated in nearly all countries of the temperate zones. The domesticated forms are derived from two basic species,

the *sweet cherry* and the *sour cherry*, and there is also a third type intermediate between the sweet and sour, known as the *Duke*. In cultivation hundreds of varieties have been developed. Although practically every state in the Union produces some cherries, there are few large commercial orchards, and several other tree fruits show a much higher yield. The most favored sections are those of equable climate. Well-established cherry orchards do not require the degree of skill in management that most other fruits demand, but the trees are difficult to transplant, and serious losses are frequently incurred by growers of young trees. The fruit must be harvested when mature, since it does not ripen after picking. Ripe cherries are easily injured, but with modern methods of packing it is possible to ship consignments from the Pacific coast to the Atlantic.

The delicious flavor of cherries is known to everyone. The fruit is equally popular whether fresh or canned, and is used in numerous ways, notably for pies,

tarts and sauce, confectionery, frozen desserts, and soda-fountain concoctions. Cherry brandies and cordials are made from the fruit of the wild black cherry. See page 1344. B.M.D.

Classification. Cherries belong to the rose family, *Rosaceae*, and to the genus that includes the peach and plum, *Prunus*. The cultivated sweet cherries and Dukes are derived from *P. avium*; the sour cherries are from *P. cerasus*. The wild black cherry (*P. sero-*

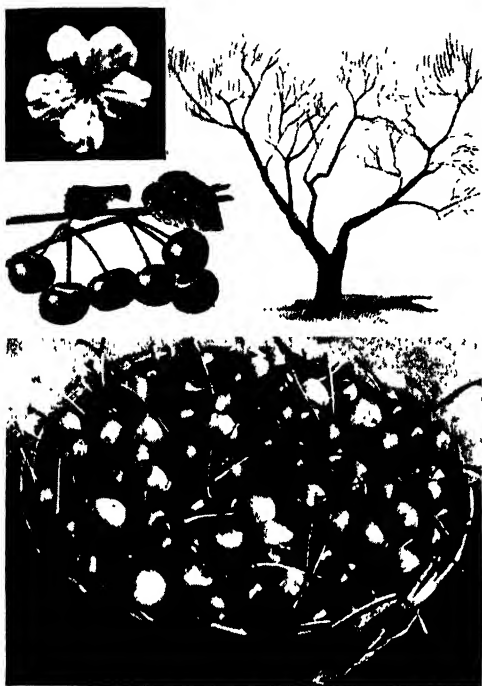


THE PYRAMID OF CHEOPS

Photos. O. R. O.

It was originally 482 feet high, and its sides were 765 feet long at the base. The corner shown is known as "The Pilgrim Way," for here is the easiest ascent to the top. In the lower illustration can be noted the great size and weight of the stones which were laid one upon another in this vast ancient monument.

lina) is a handsome, spreading tree valued for shade, lumber, and fruit. The little wild chokecherry tree (*P. virginiana*) is sometimes mistaken for a young specimen of *P. serotina*, but one bite of a bitter, puckery chokecherry should teach the unwary to recognize the tree by its much broader leaves and the disagreeable odor of leaves and bark. Yet the birds strip the fruit from the chokecherry trees, and so their seed has been widely distributed.



Sweet is the air with the budding haws, and the valley stretching for miles below
Is white with blossoming cherry-trees, as if just covered with lightest snow.

The illustration shows form of tree, appearance of flowers, detail of leaves, and the ripened fruit.

CHERRY FRUIT-FLY. See APPLE MAGGOT.

CHERRY LAUREL, *law' rel*. The cherry laurels are ornamental shrubs or small trees belonging to the same genus as the cherry of horticulture. They bear evergreen leaves and clusters of small white flowers. Their rounded stone fruits have a very disagreeable taste, and the fruit kernels, as well as the leaves of the plants, are poisonous. From the leaves is obtained poison laurel-water, which is much like oil of almonds, and was formerly used in medicine. The *common*, or *English*, cherry laurel is a favorite ornamental in Europe, and is also planted to a considerable extent in California and the states south of Virginia. B.M.D.

Scientific Name. The cherry laurels belong to the family *Rosaceae*. They are not true laurels. The botanical name of the English cherry laurel is *Prunus laurocerasus*.

CHERSONESUS, *kur so ne' sus*, a name which the ancient Greeks applied to several peninsulas. Three of the most important of these were the Thracian Chersonesus, northwest of the Hellespont, corresponding to the peninsula of the Dardanelles; the Tauric Chersonesus, the peninsula formed by the Black



Photos. Visual Education Service

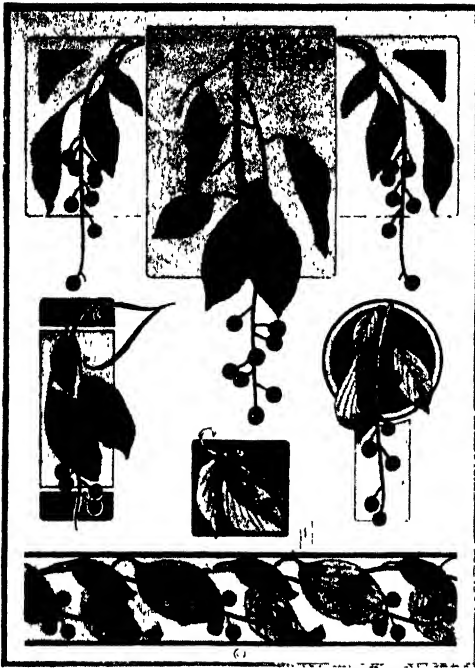
TWO OF THE CHERRIES

Wild cherry (above) and the chokecherry.

Sea and the Sea of Azov, now called the Crimea; and the Cimbrian Chersonesus, the modern Jutland.

Derivation. The word *Chersonesus* comes from the Greek *chersos*, meaning *dry land*, and *nesos*, meaning *island*.

CHERUB, or **CHERUBIM**, *chehr' u bim*. A cherub is one of an order of angelic beings ranking next to the order of *seraphim*. The cherubim (plural of cherub) are believed to excel in knowledge, the word *cherub* being derived from the Hebrew word *to know*. In art



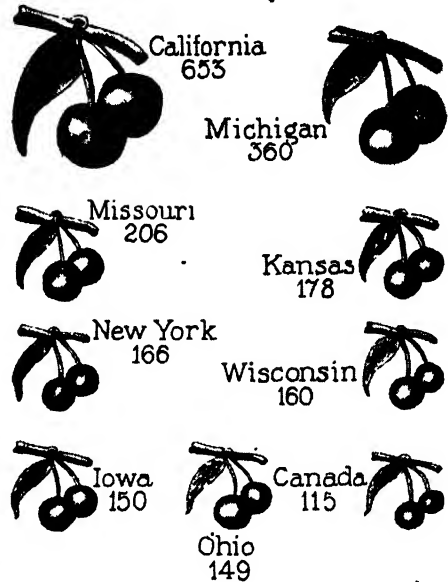
DESIGNS FOR BOOKLET

Suggested designs for cover page of a school booklet devoted to the cherry

they are usually represented by heads, with one, two, or three pairs of wings, and in the earliest religious paintings their faces are thoughtful and intelligent. The early painters also held strictly to a prescribed color scheme when representing cherubim in a Glory of Angels, a Glory being a portrayal of the several orders of angels in circles. The inner circle, that of the seraphim, is red, the symbol of love; the second, that of cherubim, is blue, emblem of light and knowledge. This law of color was observed in the oldest pictures, in illuminated manuscripts, and in stained glass. Later artists gave themselves more freedom in representing angelic beings, a change noticeable in such celebrated paintings as Raphael's remarkable *Sistine Madonna* and Perugino's *Coronation of the Virgin*.

In the Raphael picture, the Madonna is descending from clouds composed of heads of thousands of cherubim, which are shown in a golden-tinted background. In the Perugino picture, the floating cherubim have wings of various colors, blending in an exquisite harmony of tones. The aspect of serious meditation noticeable in the cherubic faces painted by the more reverent artists is beautifully exemplified in the two famous cherubim at the base of the *Sistine Madonna*, and in the cherubim in Perugino's *Assumption of the Virgin*. See MADONNA; reproduction of the ASSUMPTION (page 459).

Figures Represent Thousands of Bushels



THE CHERRIES THAT GROW IN A YEAR

The figures are compiled from latest available government reports.

CHERUBINI, *ka roo he' ne*, MARIA LUIGI CARLO ZENOBIO SALVATORE (1760-1842), an Italian musical composer, excelling especially in sacred music. He was born at Florence, and commenced his musical studies at the age of six, under his father's instruction. At nine he began to study under eminent masters and soon showed a genius for composition. Before he was sixteen he had produced his creditable *Mass and Credo in D*, and a *Te Deum* for male voices, which is still often sung. His fame first became general in 1805, when



Photo Brown Bros

CHERUBINI

he went to Vienna to compose an opera for the New Imperial Opera House. That production, *Faniska*, won him many friends, notably Haydn and Beethoven, who pronounced him the greatest composer of sacred music of the age. After 1809 he wrote sacred music almost exclusively. He made several visits to London, being appointed at one time composer to the king, and later superintendent of the king's chapel. In 1821 he became director of the

Paris Conservatory, and during his administration of more than twenty years, he brought it to a high standard of excellence. His masterpiece is the opera *Les Deux Journées* ("The Water Carrier").

CHESANA RIVER. See YUKON RIVER.

CHESAPEAKE, THE. See WAR OF 1812.

CHESAPEAKE, *ches' a peek*, AND OHIO CANAL, a waterway along the north side of the Potomac River from the former Georgetown, now a part of the city of Washington, to Cumberland, Md. This canal has an interesting history, for as far back as 1774 it was an idea of Washington's to make the Potomac navigable from tidewater to the Alleghenies. The scheme was interrupted by the Revolutionary War, but in 1784 a company was formed to revive it; Washington was the organization's head until he became President of the United States. The project was abandoned in 1820, but was later taken up and completed in 1850 at a cost of over \$11,000,000. The canal is 184 miles long, sixty feet wide, and six feet deep, with seventy-four locks having a total lift of 609 feet. Comparatively little traffic passes through it. See CANAL.

CHESAPEAKE BAY, a large inlet on the Atlantic coast extending northward through the states of Virginia and Maryland, dividing the latter into two parts, called respectively, near the bay, the Eastern and the Western Shore. The channel at the entrance is twelve miles wide, with Cape Henry and Cape Charles on either side. The bay, which the Indians called the *Great Salt Water*, is 200 miles long, from four to forty miles wide, and has a depth of from thirty to sixty feet in the channel.

The coast is very irregular, having many bays and inlets and large estuaries at the mouths of the numerous rivers which empty into it. The most important of the latter are the James, the York, the Rappahannock, and the Potomac, on the west; the Susquehanna, on the north; and the Elk, the Chester, and the Choptank, on the east.

The shores are low and marshy and abound in wild waterfowl, while the shallow, brackish waters contain vast natural beds of the famous Chesapeake oysters. Oyster beds are also planted scientifically, and the oyster trade of the Maryland and Virginia beds is the largest in the world. (The details of the oyster industry are given in these volumes under the

title OYSTER.) As the bay is navigable for deep-sea vessels nearly its entire length, it has a large foreign as well as coastwise trade. The most important port is Baltimore, which is situated on the west shore, in Maryland, on the Patapsco River. Other large, busy ports are Norfolk and Portsmouth, in the eastern part of Virginia, at the southern end of the bay. These twin cities contain large naval and coaling stations. The United States Naval Academy is at Annapolis, on the west shore of the bay, in Maryland, not far from Washington, D. C.

CHESAPEAKE BAY DOG. See RETRIEVER.

CHESS. This interesting and fascinating game is in no sense a game of chance, but is the most intellectual of all games of skill, for it not only trains the power of observation but is a mental contest which brings forth such qualities as foresight, resource, imagination, and ingenuity on the part of the players. Chess has often been compared to a game of strategy as played by two opposing generals on the battlefield, and it resembles war in the sense that it consists of attack and defense and has a definite object in view; that is, the surrender of the king, toward which all the moves of the game lead.

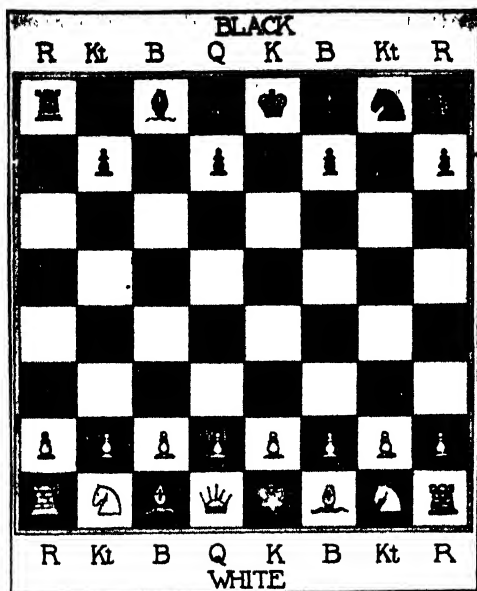
The Board and the Pieces. The game of chess is played by two persons on a board which is divided into sixty-four squares, arranged in eight rows of eight squares each, and colored alternately white and black. The same board is used in the game of checkers. Each player has a set of sixteen men; one set is colored white and the other black. Eight of each set are of the lowest grade and are named *pawns*; the other eight are of various grades and are named *pieces*. The pieces on each side consist of a *king*, *queen*, two *bishops*, two *knight*s, and two *rooks*, or *castles*. The board must be placed so that each player shall have a white square at his right hand.

The Position of the Pieces. At the beginning of the game all the men are arranged upon the two rows of squares next to the players, the pieces on the first, or nearest, row, and the pawns on the row immediately in front of the pieces. The king and queen occupy the two central squares facing the corresponding pieces on the opposite side. The rule to be remembered is that the queen *always* occupies her own color, which means that the white queen is set on the light square and the black queen on the black square. The two bishops occupy the squares next to the king and queen; the two knights, the squares next the bishops; the castles occupy the last, or corner, squares. The illustration shows how the men are arranged when the game starts. The men standing on the king's or queen's side of the board are named, respectively, *king's*



LOCATION MAP

and *queen's men*. Thus, king's bishop or knight is the bishop or knight on the side of the king. The pawns are named from the



CHESSBOARD AND MEN

The position of the pieces at the beginning of the game.

pieces in front of which they stand, such as *king's pawn*, *queen's castle's pawn*, and so on. The names of the men are abbreviated, as follows: King, *K*; King's Bishop, *KB*; King's Knight, *KKt*; King's Castle or Rook, *KC* or *KR*; Queen, *Q*; Queen's Bishop, *QB*; Queen's Knight, *QKt*; Queen's Castle, *QC* or *QR*; Pawns, *P*.

The Moves of the Pieces. In chess, a man captures by occupying the position held by the captured man, who is then removed from the board. In this, the game differs from checkers, where the piece played is set one square beyond the man "jumped." The *pawn* moves straight forward one square at a time, with two exceptions: when it is moved first, in which case it may be advanced either one or two squares, at the discretion of the player; and when it captures a man, at which time it always moves diagonally one square, to the position of the captured man. A pawn never moves backward. A piece or another pawn directly in front of it stops its progress. When a pawn reaches the eighth row, or the extreme limit of the board, it may be exchanged for any piece previously lost which the player chooses. As a rule, the queen, the most valuable piece, is chosen, if during the game that piece has been lost. This is called *queening a pawn*.

The *rook*, or *castle*, moves for any distance in a straight line either forward, backward, or sidewise, but *not diagonally*.

The *bishop* moves any distance either backward or forward, but *only diagonally*. It must be noted that a bishop always moves on squares of the same color.

The *queen* is the most powerful piece on the board; she can move any distance in any straight line, either forward, backward, sidewise, or diagonally, as far as her path is clear. It is of course understood that one of her own men stops her progress, but she may capture an opponent exposed to direct approach.

The *king* is at once the weakest and most valuable piece on the board. As regards direction, he is as free as the queen, but for distance he is limited to *one square* at a time. Standing on any central square, he commands the eight squares around him, and no more.

Castling. Besides his ordinary move, the king has another, by special privilege, in which the castle participates. Once in the game, if the squares between king and castle are clear, if neither king nor castle has been moved, if the king has not been attacked by any hostile man, and if no hostile man has commanded the square over which the king has to pass, the king's or queen's castle can be placed next to the king and the king can be moved over the castle to the adjoining square. This move is called *castling*.

The *knight*, unlike the other pieces, has a peculiar move. He moves over two squares at a time, one of which is diagonal and the other is straight. He may move in any direction, and he can leap around any man occupying a square intermediate to that to which he intends to go. The knight always moves to a square of a different color. The knight, like the king, when on a central square on the board, commands eight squares, which are at two squares' distance, as shown in the third illustration.

The Value of the Pieces. If the pawn is taken as the standard of unity, the relative value of the pieces is as follows: pawn, 1; bishop or knight, 3; rook, 5; queen, 9. The knight or the bishop is usually known as a "minor piece." The value of the pieces also depends upon the state of the game. Thus, at the end of the game a pawn is much more valuable than at the beginning, and a knight is generally stronger than a bishop; on the other hand, two bishops at the end are more valuable than two knights.

Check and Checkmate. The definite aim in chess is to force the surrender of the opposing king. The king in chess cannot be taken; he can only be in such a position that if it were any other piece he would be taken. When a piece or pawn attacks him, he is said to be

in check; that is, he is in such a position that the next opposing move would capture him, and the opponent is bound to give notice by

TR8	TR7	TR6	TR5	TR4	TR3	TR2	TR1
QR8	QR7	QR6	QR5	QR4	QR3	QR2	QR1
TR8	TR7	TR6	TR5	TR4	TR3	TR2	TR1
QR7	QR6	QR5	QR4	QR3	QR2	QR1	
TR6	TR5	TR4	TR3	TR2	TR1		
QR6	QR5	QR4	QR3	QR2	QR1		
TR5	TR4	TR3	TR2	TR1			
QR5	QR4	QR3	QR2	QR1			
TR4	TR3	TR2	TR1				
QR4	QR3	QR2	QR1				
TR3	TR2	TR1					
QR3	QR2	QR1					
TR2	TR1						
QR2	QR1						
TR1							
QR1							

NAMES OF THE SQUARES

saying "check." When the king is in check, all other plans must be abandoned and all other men sacrificed, if necessary, to save him from that situation. This is done either by removing him to an adjacent square not commanded by any man of the adversary, or by interposing one of his own men, and so screening him from check, or by capturing the attacking man. When the king can no longer be defended on being checked by the adversary, he is *checkmated*, and the game is ended.

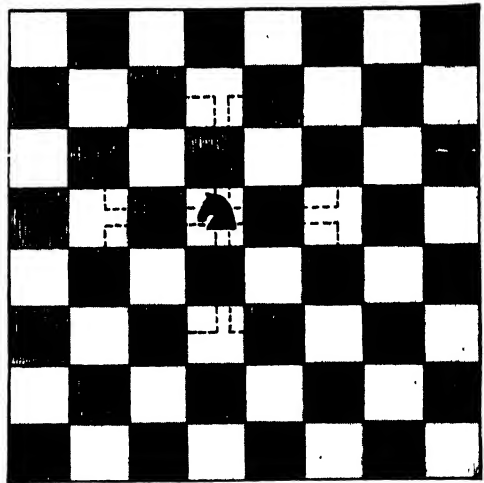
When neither of the players is able to checkmate the other, the result is a *drawn game*. When the player having the superior force, by oversight or want of skill, blocks his opponent's king so that he cannot move without going into check and none of his other men can be moved, such a situation is known as *stalemate*, and the game is considered a draw.

Opening, Middle, and End. A game of chess can be divided into three parts: the opening, the middle, and the end. In the opening, each player seeks to move his pieces in such a way as to secure the best strategic position for the actual battle which develops in the middle game. The various openings of a game are explained in all books of chess, and any player who wishes to gain proficiency must master the openings. A few broad principles governing the opening are to play forth the minor pieces early, to castle the king in good time and not expect to establish a strong attack with half of one's forces at home.

The actual battle takes place in the middle game and results in the capture of such a number of pawns and pieces as usually decides

which side will eventually win the game. It is during the middle game, where such an endless variety of situations is to be found, that the players have the opportunity to display all their ingenuity and power of combination. A few simple hints which ought to guide a player during any part of the game are to try always to perceive the motive of the adversary before making the next move; to look over the board to see whether he cannot make a better move than the one he intended to make; to be careful not to play into his opponent's hand by being tempted to capture a piece which is only intended as a bait.

Notation. The rows of squares running straight up and down the board are called *files*; those running from side to side are called *lines*. Each of the sixty-four squares of the chess board has a name and two numbers, as is shown in the second illustration. Each square is named after the piece which occupies it at the beginning of the game, and is called the *king's square* or the *queen's square*, and so on; the whole file has the same name. But each player counts from his own side, and it is easily seen that row number 1 for him is row number 8 of his adversary, and row number 2 for him is row number 7 for his adver-



THE MOVES OF THE KNIGHT

The dotted lines show possible direction and distance in any one move; the dot shows where any of these moves will place him.

sary, and so on. Other signs used in chess books or in the explanation of chess problems are: (—), *to*; (x), *takes*.

The Scholar's Mate. We give below, as an example, a short game which has been practiced upon young and inexperienced players and which never fails to cause such a player the greatest astonishment. It is called the

scholar's mate, and in this game checkmate is given in the first few opening moves. The movements can be followed on the diagram in the second illustration:

- | WHITE | BLACK |
|-------------------------|-------------|
| 1. P-K 4 | 1. P-K 4 |
| 2. KB-QB 4 | 2. KB-QB 4 |
| 3. Q-KR 4 | 3. KKt-KB 3 |
| 4. Q-KB 7 and checkmate | |

History. The game of chess, which is the most cosmopolitan game and is played now in every part of the world, originated in Asia. It seems probable that it was invented in India, and from there it was introduced into Persia. The Arabs conquered Persia in the seventh century, learned the game, and introduced it into all the countries they conquered afterward. In this way chess reached Spain, whence it spread all over Europe. Benjamin Franklin popularized the game in the United States.

Derivation. The name in all the European languages is derived from the Persian word *shah*, which means *king*, and indicates the aim of the game.

CHEST, OR THORAX, *tho' raks*, the boxlike portion of the human body that lies between the neck and the abdomen. It is shaped somewhat like a cone, with the narrower end upward. The ribs, which are attached to the breastbone in front and to the spinal column behind, form its sides.

Within the thorax are the heart, the lungs, the great arterial and venous trunks, the windpipe, the bronchi, the oesophagus, the thoracic duct. There are several small openings at the top of the thorax through which pass the large arteries and veins, the important nerves supplying heart and lungs, the windpipe, and the oesophagus. The bottom of the thorax is formed by a large layer of muscle, known as the *diaphragm*, (which see); it completely separates the thoracic from the abdominal cavity. This layer of muscle is perforated by the aorta, vena cava, oesophagus, and thoracic duct—those structures which pass from one cavity to the other.

In the act of breathing, the muscles which connect and cover the ribs cause them to be drawn upward and outward, while the diaphragm flattens downward. Thus, the chest can be increased in size in every direction; when one takes a deep breath, the volume of the chest cavity becomes greater, and the lungs, due to a slight vacuum which exists between them and the chest wall, are stretched out to fill this greater space. In so doing, air is drawn into the lungs. In expiration, as the chest becomes smaller, the thoracic wall and diaphragm press lightly against the lungs, and the air is expelled. It is evident, therefore, that the lungs have no power to expand and contract, but that their movement within the

thorax is entirely passive. In normal, quiet breathing, only one-seventh of the total capacity of the lungs is used. See **BREATH AND BREATHING**.

K.A.E.

CHESTER, ENGLAND. See **ENGLAND** (The Cities).

CHESTER, GEORGE RANDOLPH (1869-1924), a popular American author of fiction dealing with everyday life. A breezy, entertaining style, brisk narrative, and unflinching humor won a steady market for his stories. Chester was born in Ohio, left home at an early age to make his own way in the world, and after holding a number of positions of a varied sort, he became a reporter on the *Detroit News*. From this position he advanced to that of Sunday editor of the Cincinnati *Enquirer*, and he soon became a regular contributor to leading magazines. He established his reputation with the *Gel-Rich-Quick Wallingford* stories, from which a successful play was adapted, and followed the series with *A Cash Intrigue*, *The Making of Bobby Burnit*, *Cordelia Blossom*, *The Jingo: A Tale of Red Roses*, and others. At his death he was engaged in writing a series of tales about Hollywood, the chief center for the production of American moving pictures.

CHESTER, PA., is the oldest city in the state, situated in Delaware County, in the extreme southeastern corner of the state, and on the Delaware River. Philadelphia is fifteen miles northeast, and Wilmington, Del., is fourteen miles southwest. The city has fine transportation service through the Pennsylvania, the Baltimore & Ohio, and the Philadelphia & Reading railroads. Population, 1928, 74,200 (Federal estimate).

Chester was settled by Swedes in 1643, and was known as Upland until 1682, when the name was changed to its present one by William Penn. It was laid out in 1700, and became a city in 1866. Here, in 1777, Washington reassembled his troops after the Battle of the Brandywine.

The home of William Penn, founder of Pennsylvania colony, is a feature of historical interest. The locality is the seat of Pennsylvania Military College, Crozier Theological Seminary (Baptist), and Swarthmore College.

Industry. Formerly, shipbuilding was the chief industry in Chester, several vessels of the United States navy were built in its immense shipyards, which were classed with the largest in the United States. But its good harbor and exceptional transportation facilities by water and rail have given variety to industry, and have made the city the trade center for a very prosperous section. Manufacturing interests are largely centered in silk, cotton, and woolen goods, shipbuilding materials; over 8,000 people are employed in the 300 factories.

CHESTERFIELD, PHILIP DORMER STANHOPE, Earl of (1694-1773), an English writer and statesman whose political career means

less to the world than does the influence of the remarkable grace and polish of his manners. His name has become a synonym for elegance of demeanor, and to say that a man has the manners of a Chesterfield is to pay the highest possible compliment to his good breeding. Chesterfield's letters to his son, in which he gave him advice in matters of etiquette, are famous, and are justly admired for their literary excellence.



Photo. Brown Bros.

LORD CHESTERFIELD

Lord Chesterfield succeeded his father, the third earl, in 1726. Two events stand out prominently in his political career—his appointment as ambassador to The Hague, in 1728, and as lord-lieutenant of Ireland, in 1745. Both positions he filled with ability. As a member of the House of Lords, he was an active and bitter opponent of Walpole (see WALPOLE, HORACE). Chesterfield was made Secretary of State in 1746; two years later he retired to private life.

CHESTERTON, GILBERT KEITH (1874-), an English poet, essayist, and novelist, one of the most original and forceful of the modern group of British writers. The outstanding feature of his work is an extreme fondness for paradox. He was educated at Saint Paul's School and later attended the classes of the Slade Art School. His first important publication, a volume of poems collected under the title of *The White Knight*, appeared in 1900, just after the outbreak of the South African War. During the next three years, Chesterton became widely known through his brilliant anti-imperialistic articles in the *Speaker* and the London *Daily News*, and at the close of the war he was asked by John Morley to write a sketch on Browning for the *English Men of Letters* series. His discussion of Browning and one of Dickens, which appeared later, are illuminating and sympathetic literary criticisms.

Chesterton's philosophy, that of a man violently opposed to the attitude of the modern

age, is strikingly set forth in such volumes of essays as *Heretics*, *Orthodoxy*, and *Outline of Sanity*.

His Stories. His fiction includes several collections of ingenious detective stories centered about the exploits of "Father Brown", and the novels *Manalive*, *The Flying Inn*, *The New Jerusalem*, *Incredulity of Father Brown*, *The Everlasting Man*, and *The Return of Don Quixote*.

CHESTNUT, *ches' nut*. The chestnuts are a genus of valuable trees belonging to the beech family. But two species are native to North America—the "spreading chestnut tree" of Longfellow's well-loved poem, and the smaller *chinquapin*, which is merely a shrub east of the Appalachian Mountains. The common chestnut is a beautiful tree that sometimes grows to be 100 feet high. It is a joy to the eye the year round. In the spring appear the well-shaped, glossy, dark-green leaves; then come yellow, fragrant catkins, and in



The chestnuts, lavish of their long-hid gold,
To the faint Summer, beggared now and old,
Pour back the sunshine hoarded 'neath her favor-
ing eye.

—LOWELL: *An Indian-Summer Reverie*.

autumn, leaves of pure gold with borrowed summer sunshine. At last, we find it standing "knee-deep" in its own yellow leaves, and scattered all about are the velvet-lined burs, turned brown with frost, yielding their store of smooth, brown nuts. American chestnuts have the finest flavor, but those of Spain and Italy are the largest, and in those countries they are a staple food among the peasants.

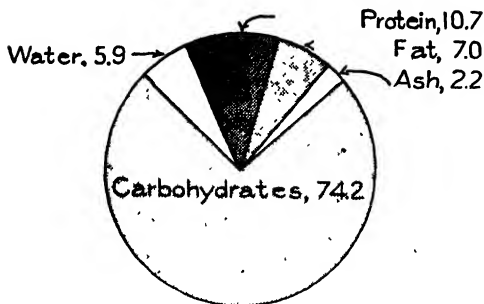
Ordinary chestnut trees bear nuts only after the tenth or twelfth year, but Luther Burbank produced a chestnut seedling which bears nuts in eighteen months. Chestnuts are eaten raw or boiled, baked or roasted, and



Photo. U & U

GILBERT K. CHESTERTON

sometimes are dried and ground into flour for bread or cakes. They are often used with candy, desserts, and poultry dressing. Chestnut



COMPOSITION OF CHESTNUTS

bark is valued for tanning, and the timber is used for woodwork, furniture, railroad ties, fence posts, and fuel.

It is a great misfortune that the American chestnut seems doomed to extinction because of the attacks of the chestnut-tree blight, a fungus disease imported from China. Since 1904, when the trouble was first noticed in New York Zoölogical Park, the disease has been spreading rapidly throughout the chestnut regions, from the Eastern states southward and westward. A nut-bearing, blight-resistant tree that may some day take the place of the original chestnut has been produced by the United States Department of Agriculture. This is a cross between the Japanese chestnut and the chinquapin. B.M.D.

Scientific Names. Chestnuts belong to the family *Fagaceae*. The common American chestnut is *Casanea dentata*. The chinquapin is *C. pumila*.

CHESUNCOOK, *che sun' kook*, LAKE. See MAINE (Lakes and Rivers).

CHEVALIER BAYARD, *shev a leer' ba yah'r'*. See BAYARD, PIERRE DU TERRAIL.

CHEVIOT, *chev' i ut*, HILLS, a low mountain range lying partly in Northumberland, England, and partly in Roxburghshire, Scotland, forming about thirty-five miles of the boundary line between the two countries. The hills extend from the River Tweed on the northeast to the sources of the Liddel on the southwest. They are smooth in contour and covered with grass, providing excellent grazing ground for the famous Cheviot sheep. The region is also noted for its grouse. During the Border wars, the hills were the scene of much of the romance and history of those troublous times, and they will always be associated with the old ballad, *Chevy Chase*.

CHEVY CHASE. See above.

CHEWING GUM. See GUM, CHEWING.

CHEWINK. See FINCH.

CHEYENNE, *shi en'*, WYO. See WYOMING (back of map).

CHEYENNE INDIANS. See INDIANS, AMERICAN (Most Important Tribes).

CHEYENNE RIVER. See SOUTH DAKOTA (Rivers and Lakes).

CHIAROSCURO, *ke ah ro skoo' ro*. One of the most difficult things to master in painting is the handling of light and shade, or *chiaroscuro*, as it is called, from Italian words meaning *light* and *dark*. Unless objects in the light stand out and those in the shadow are properly subordinated, perspective seems to be lacking. Correggio and Rembrandt rank among the great masters of the art of *chiaroscuro*.

CHICA. See FERMENTED LIQUORS.



CHICAGO, ILL. While the site of Chicago was still a wilderness of marsh and forest roamed by Indians, the three cities of the world that surpass it in population were great centers of trade and industry, and two of these had many centuries of growth back of them. For only London, New York, and Berlin are larger than this metropolis of Illinois and of inland America. Quite as remarkable as its size and

rapidity of growth is the restless energy which has characterized every step of its advance. William Vaughn Moody, a poet who spent many years in Chicago, described its dominant spirit in the lines—

And yonder where, gigantic, wilful, young,
Chicago sitteth at the northwest gates,
With restless, violent hands and casual tongue,
Molding her mighty fates.

Briefly Stated. A few of the many facts relating to Chicago may be summarized briefly. Some of the figures are subject to constant slight changes.

Area, 210.5 square miles.
 Banks, national and state, in city and suburbs, 250.
 Boulevard mileage, 130.
 Building permits yearly, exceeding \$360,000,000.
 Cemeteries, 61.
 Churches, 1,200.
 Dispensaries, 22.
 Elevation above sea level, 600 feet.
 Fire-engine companies, 128; hook and ladder companies, 38.
 Firemen, officers and men, 2,325.
 Golf courses within twenty-five miles of the business center, 180.
 Homes, about 670,000.
 Hospitals, 84.
 Length of city, north to south, 26 miles; width from east to west 9½ miles.
 Libraries, 26 (including the public library and its many branches as 1).
 Mail carriers, over 3,000.
 Medical schools, 29.
 Newspapers and periodicals, about 800.
 Parks, area, 6,500 acres.
 Police, officers and men, average 6,100.
 Postoffice clerks, about 6,200.
 Public schools, 340.
 Pupils in public schools, about 525,000.
 Street, longest (Western Avenue) 23½ miles.
 Street railway mileage, 1,350.
 Streets and alleys, 5,160 miles.
 Teachers in public schools, more than 12,500.
 Theaters, including playhouses and moving-picture theaters, about 330. Some of the latter group have seating capacities of 4,500 and 5,000.
 Voters, registered, exceed 1,250,000.
 Water used per day, about 900,000,000 gallons.
 Wage-earners, over 1,250,000.

The People. Chicago has a greatly varied population, about seventy-seven per cent of its inhabitants being foreign-born or of foreign parentage; twenty-eight nationalities are represented. By far the most numerous of these adopted citizens are the Poles, of whom there are over 358,000. That is, Chicago is a larger Polish city than is Vilna, one of the most important cities of Poland. Germans rank next in number, then Russians, Czechoslovaks, Swedes, and Italians, in that order. Newspapers are published regularly in at least ten languages, and within the confines of the city the church service is given in at least a score. The total population of Chicago in 1910 was 2,185,283; in 1920 it was 2,701,212; in 1929 the Census Bureau estimated it to be 3,250,000.

Size and Location. It is the popular belief that Chicago's area is greater than that of any other American city except New York, but it is third in area, and New York is second;

the area within Los Angeles' corporate limits is greatest. The area of Greater New York is 191,760 acres; of Los Angeles, 262,896 acres; of Chicago, 133,800 acres, or 210.5 square miles.

Chicago has more than 5,000 miles of streets and alleys—more than the entire road mileage in some of the small states of the Union. The city proper has a frontage on Lake Michigan of twenty-six, and with compactly built suburbs, which are continuous extensions of the city, of about thirty-three miles. The greatest east and west extent is nine and one-half miles. Densely populated suburbs extend more than two miles farther west.

Chicago is in Cook County, of which it is the county seat. It lies along the southwestern shore of Lake Michigan, on a plain but fifteen feet or thereabouts above the level of the lake, or 596 feet above sea level, and much of the land along the shore has been built up from a flat beach.

Though it is called a Western city, and is Western in spirit, Chicago is in reality well to the east of the center of the country; it is 2,274 miles from San Francisco, and but 911 from New York. Its marvelous growth in population and commercial and industrial importance has been largely due to its position at the head of Lake Michigan, where it formed for many years the only outlet for the products of the Middle West.

Plan of the City. The original plan of the city was influenced very decidedly by the Chicago River, a little stream, but a very important one. It is formed by two branches, one from the northwest and one from the southwest, which unite less than a mile from the lake, meeting the lake nearly midway between the northern and southern limits of the city. This stream was once sluggish, unpicturesque, and very dirty, because it carried pollution into the lake, but it is now clear water, and it no longer flows into the lake. When the great Drainage Canal was completed, the water course was reversed; its flow is now from Lake Michigan, inland from its mouth, into the Drainage Canal and eventually into the Illinois and Mississippi rivers. It is the only river in the world whose flow is

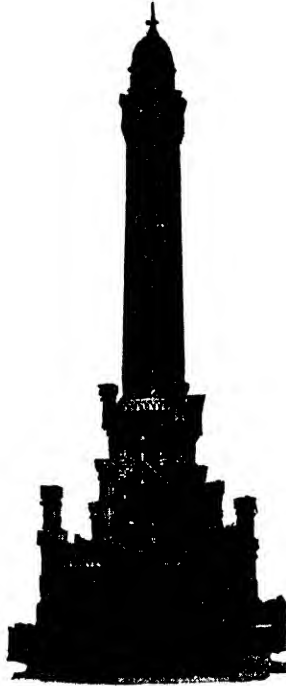


Photo. U & U

CHICAGO AVENUE WATER TOWER

This beautiful structure escaped destruction in the great fire of 1871; built in 1869, it remains a landmark of earlier days.

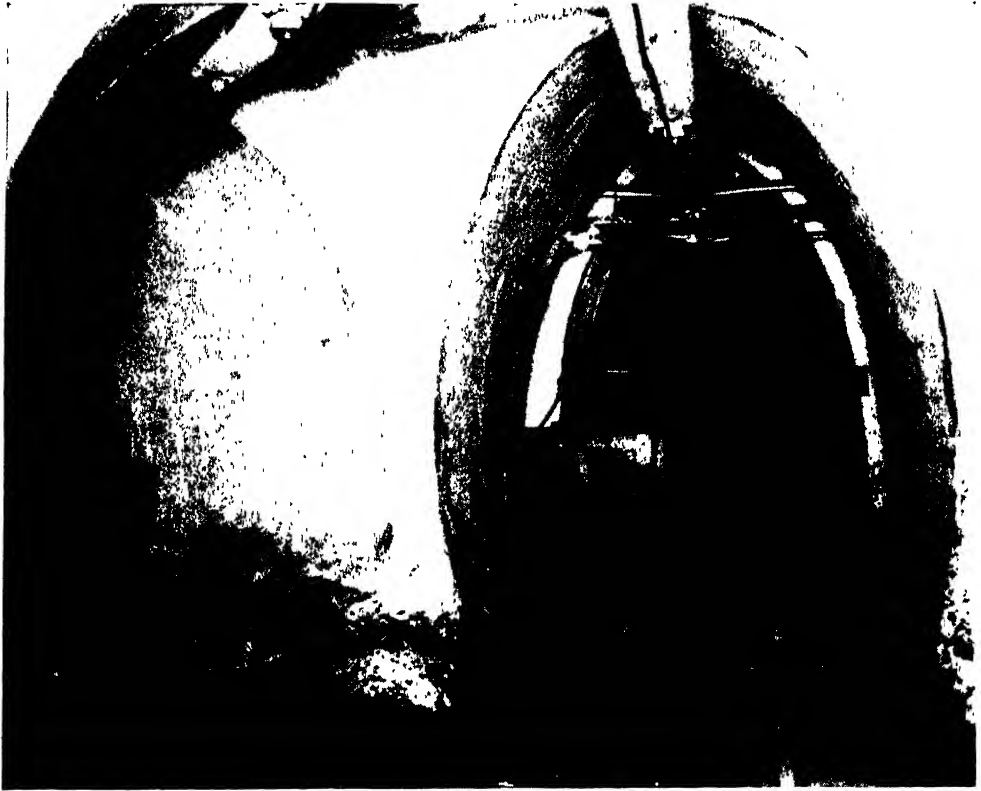


Photo. U & U

FREIGHT TUNNELS REDUCE TRAFFIC CONGESTION

Freight trains are dashing past nearly every corner in the "Loop" at frequent intervals. These trains are heavily loaded with merchandise which they discharge at the big department stores and at various other mercantile establishments. They handle so much freight that it is estimated that fully 5,000 trucks are taken off the streets that, otherwise, would be passing through the Loop. There are no collisions, for the trains use their tracks on a one-way system, guarded by block signals. The rolling stock now in use in the tunnels, 40 feet below Chicago's street surface, consists of 132 electric locomotives, of from 30 to 50 horse power each, and 3,000 freight cars of various types, each four feet wide and ten feet long, with a capacity of from one to six tons.

away from its mouth. Most of the city's shipping centers now at the Navy Pier, at the mouth of the river, and thus the two-mile extent of the river within the industrial center is less congested than formerly.

By the Chicago River and its branches, the city is divided into three well-recognized districts, or "sides": the South Side, including all the territory south and east of the river; the North Side, including all that to the north; and the West Side, much the greatest in area, to the west of the river's branches. Three great tunnels and no fewer than forty-nine bridges with movable spans connect the various parts of the city with each other. In the main the streets are regularly laid out, crossing each other at right angles.

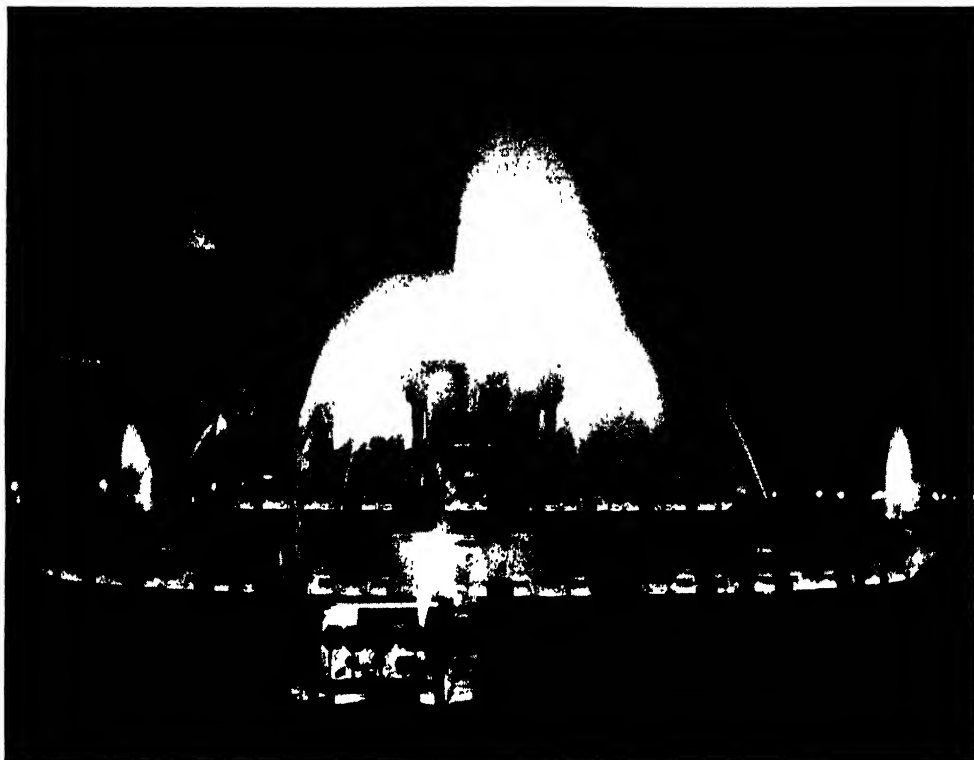
The Business Section. One feature very characteristic of Chicago is its "Loop," or business district, which is crowded into an area little more than one and one-half square miles in extent. Not all of its great business

houses are within that space, but the larger proportion, and by far the more important, of them are there. In other cities a man may have to travel miles to consult his dentist, his oculist, and his physician, buy his clothing, and lunch at his favorite restaurant; in Chicago he can do it all within a very few blocks. This has its advantages, but it also has its disadvantages. The crush in the streets and the din from street cars, trucks, elevated trains, and automobiles are by no means soothing to the hardened resident, while to the stranger they are nerve-racking. During comparatively late years, the noise and the crowding have been greatly lessened by the construction of sixty miles of tunnels, forty feet below the surface, through which most of the heavy freight is carried; the tunnel company uses 132 electric motors and 3,000 cars for freight, which run on tracks of 2-foot gauge.

Within the business district, State Street stands as the center of the retail trade. Depart-



The Freight Tunnel System. Superimposed on this airplane view of "downtown" Chicago are lines showing the location of the lines of the freight tunnels. They extend farther to the south and east than can be shown in the illustration.



THE BUCKINGHAM MEMORIAL FOUNTAIN

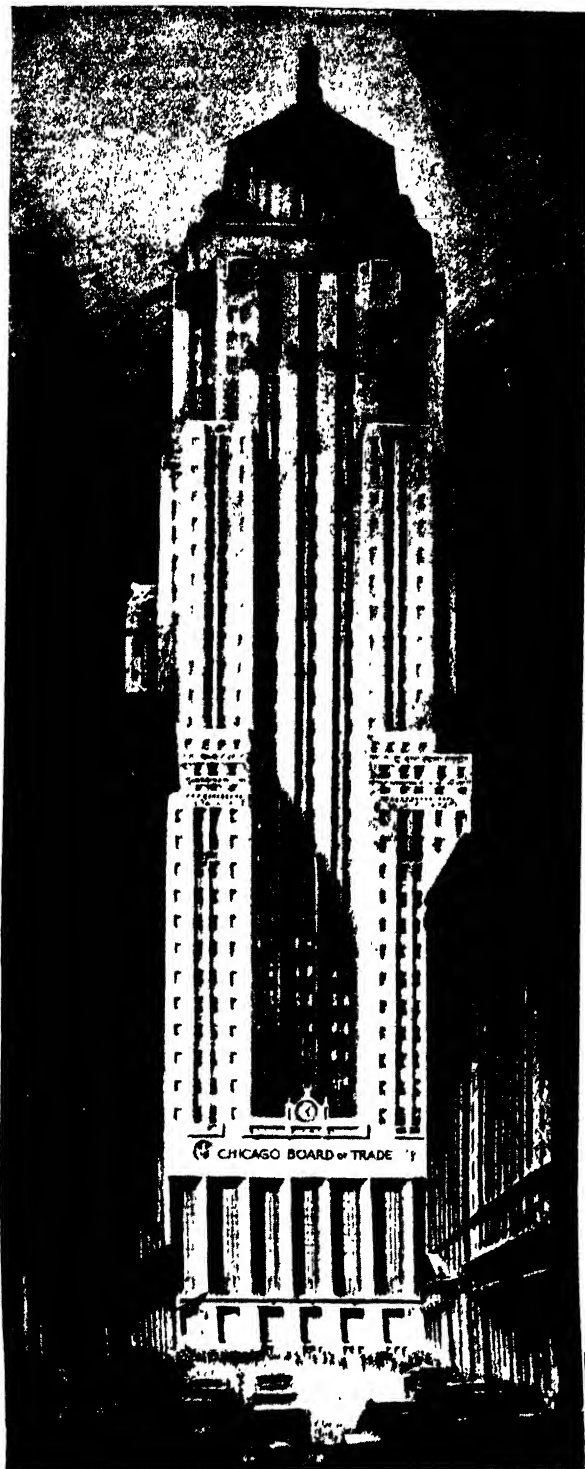
From an intricate switchboard in a large room below the surface of the ground, multicolored lights illumine every spray of water. This is the largest fountain of the kind in the world.

ment stores have been brought to a high state of efficiency in Chicago, and the group on State Street is the largest in the world. The great retail establishment of Marshall Field & Company, covering more than an entire block, is unmatched elsewhere in the world in size and equipment. Wells Street is the center of the wholesale dry-goods trade; La Salle Street is the financial district, or "Wall Street of Chicago."

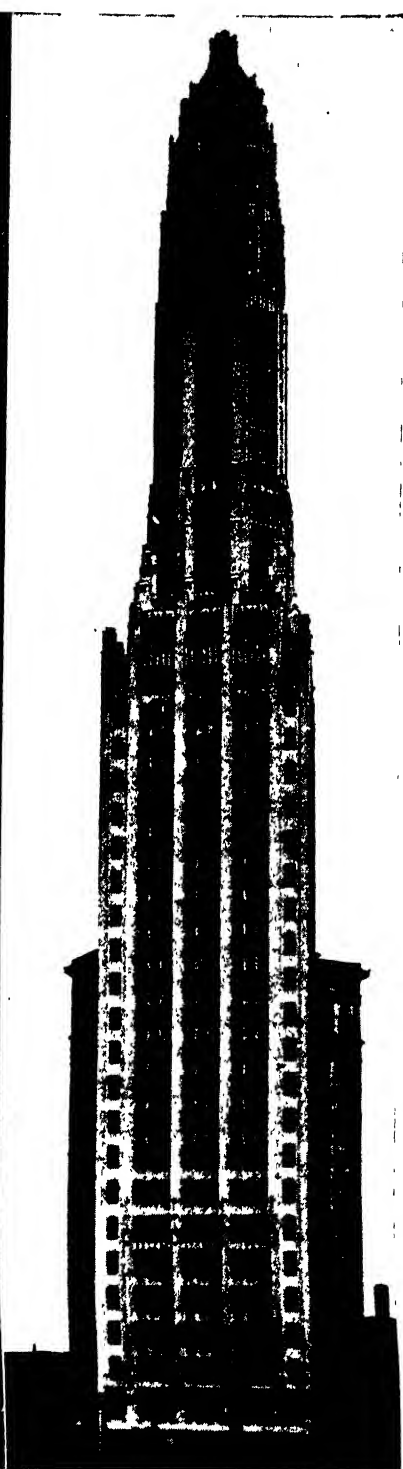
The most notable street of the downtown district, and for a mile one of the finest vistas in the world, is Michigan Avenue, the first street west of the lake. With the grassy stretch of Grant Park to the east and many of the most substantial and striking buildings of the city on the west, and with its beautiful lighting system, it is probably unexcelled. In accordance with its "city beautiful" idea, Chicago has been devoting much attention to beautifying its lake front. Colonnades, the largest illuminated fountain in the world (the Buckingham Fountain), pillared terraces, Lincoln and Logan statues, and ornamental bridges have been added. At the south end of Grant Park, east of the Illinois Central Railroad tracks and close to the shore of the lake, are Field

Museum of Natural History, the largest marble building in the world; Soldier Field, a great athletic concourse; the Shedd Aquarium; and a planetarium designed to show the relative positions of over 4,500 planets, planetoids, and stars. Facing Michigan Avenue, in Grant Park, is the Chicago Art Institute; it is the only building in the park along Michigan Avenue; the Goodman Memorial Theater, whose auditorium is nearly all underground, is east of the avenue.

The Skyline. For many years, in order that the congested business district should not be deprived of light and air in its stores and offices, ordinances decreed that no building should exceed 200 feet in height; the limit was later raised to 260 feet. During those years the city's greatest buildings were four-square, boxlike structures, sixteen to eighteen stories in height. To-day ordinances permit buildings reaching skyward an indefinite number of stories, if placed where they will not deprive neighboring buildings of light and air, or where the set-back style of architecture is employed. The skyline no longer shows buildings of practically uniform height; throughout the business district towering shafts rise above



NEW BOARD OF TRADE BUILDING
More than forty stories in height.



MATHER TOWER
A modern Cleopatra's Needle.

Photos: P & A

their neighbors, and Chicago is becoming known as "Tower Town."

A City of Great Hotels. On Michigan Avenue, the world's largest hotel, the Stevens, rises twenty-five stories above the street level, and contains 3,000 rooms. The Palmer House, with 2,200 rooms, and the Morrison Hotel, with a tower reaching forty-two stories above the street, are within the Loop, as are also the lofty Sherman and the La Salle, both among the city's greatest hotels. On Michigan Avenue, also, are the Auditorium and the Congress hotels, older than any of the others named above. Newer and among the city's most famous hotels is the Drake, over a mile north of the Loop, facing the lake and the Lake Shore Drive. One of the greatest properties of this class in America is the Edgewater Beach Hotel on the North Side. Scores of other hotels, for residential and transient guests, dot the city.

Other Buildings. The newer business structures reflect the most modern architectural designs. Possibly the most beautiful newspaper building in the world is the 35-story Gothic Tribune Tower, near the Michigan Avenue bridge. South of it, facing the river, is the 33-story "333 North Michigan Avenue." Also grouped near Michigan Avenue Bridge are the London Guarantee and the double Wrigley buildings. North of the Tribune Tower is the Medinah Athletic Club, a 42-story Shriners' club building. Within the Loop or near its borders are the needle-like Mather Tower, the Pittsfield, the Roanoke Tower, the Wiloughby Tower, the Pure Oil, the Straus, the Bankers, the Steuben Club, largest in the world—all thirty or more stories in height. The new Civic Opera building is one of the city's largest and most beautiful structures. Among bank buildings, the Continental-Commercial, Illinois Merchants, the Federal Reserve Bank, and the new Foreman Banks building are notable. A Board of Trade building, reaching more than forty stories in height, was completed in 1930. (See, also, section below, *Utilization of Air Rights*.) A mile north of the Loop is the 37-story Palmolive Building, completed in 1929.

River-Front Improvement. Formerly the commission merchants of the city centered their activities for about four blocks on South Water Street, along the south bank of the river and west of Michigan Avenue. They agreed to abandon their desirable location and move to a new center on the West Side. This made possible one of the greatest civic enterprises ever undertaken by any city. South Water Street has become Wacker Drive, with a wide, double-decked roadway facing the river, both east and west of Michigan Avenue. Already some of the most stately of Chicago's business buildings are on the Drive; eventually its entire length will be lined with

structures of striking architecture. The north bank of the river is to be developed some day in the same manner.

Straightening the River. Southwest of the Loop the course of the Chicago River interfered with city planning. Railroads with terminals



Photo. Visual Educational Service

OLD MICHIGAN AVENUE

This illustration dates from 1906—the "horse and buggy" period. Not one of these buildings now stands; they have been replaced by towering skyscrapers from twenty to forty stories in height.

south of the Loop spread their yards in a network east of the river and prevented development toward the south. By digging a new river bed for a distance of several blocks and thus changing the course of the stream, at a cost of many millions of dollars, there was provided room for rearrangement of railroad tracks and for expansion of the city's business interests. New street outlets to the South Side were made possible. Work was begun on this project in the fall of 1928.

Utilization of Air Rights. Railroads entering the city have networks of tracks penetrating to the business district. Though necessary, they are unsightly. Legal objections having been removed, the railroad companies may now sell air rights over their tracks for the construction of buildings. The first of such structures was completed over the tracks of the Chicago, Milwaukee, Saint Paul & Pacific in 1929 by the Chicago *Daily News* Company, involving an investment of \$14,000,000. It faces the Chicago River, on its west bank. The same year the Marshall Field Estate finished a great Merchandise Mart on the north bank of the river, utilizing air rights secured from the Chicago & North Western Railway. This structure has 4,000,000 square feet of floor space. The Illinois Central Railroad, whose depressed yards skirt the lake front, offers exceptional opportunities for utilization of air rights, and great structures more than fifty stories in height are projected on sites owned by the railroad and facing Chicago River. One proposal, providing for a building



North from Michigan Avenue Bridge. At the left is a double building erected from the profits on 5-cent packages of chewing gum. Beyond and across the street is the Gothic *Tribune* Tower. 1357

Photo: U & U

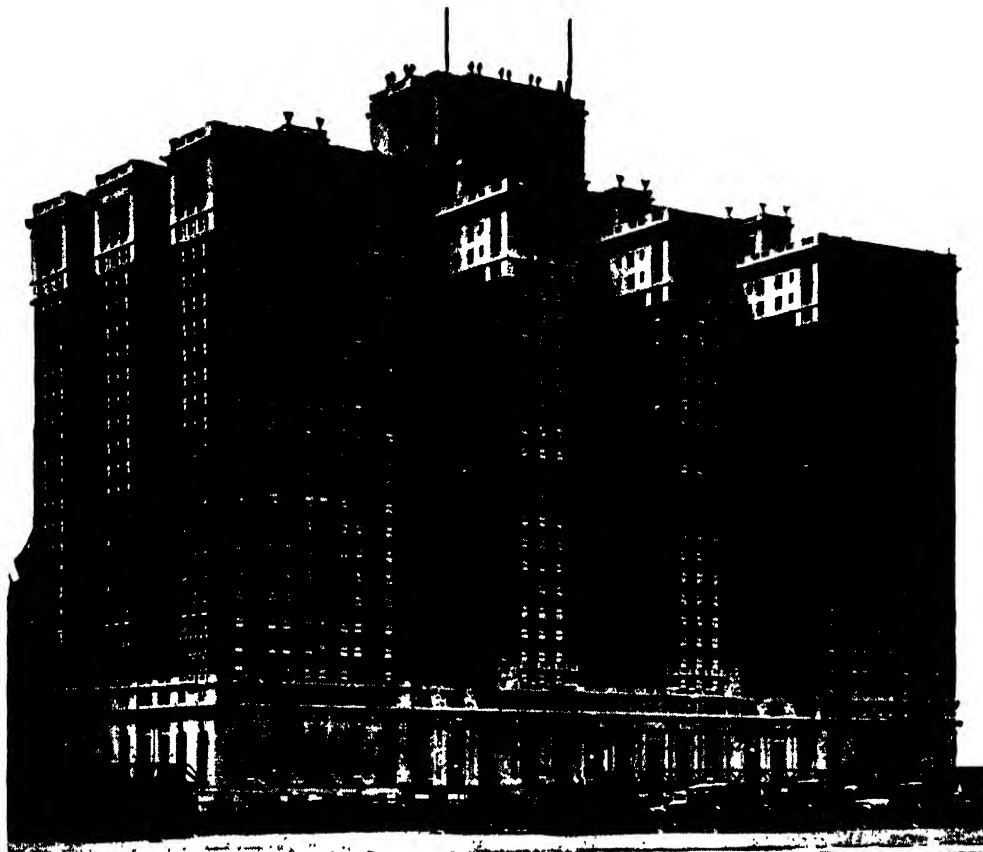


Photo U & U

THE WORLD'S LARGEST HOTEL

If a person were to register as a permanent guest and ask the privilege of sleeping in a different room each night, he would be a resident for eight years and nearly three months before he could occupy all of the 3,000 guest rooms. Moreover, at the end of the period he could boast that he had slept on sixty carloads of mattresses. Equipment of the several dining rooms required the purchase of 134,000 plates and fifty carloads of other chinaware, 138,000 tablecloths, 300,000 napkins, 48,000 drinking glasses, three carloads of silverware, and 60,000 bath towels. The guest rooms contain 6,000 pictures—paintings and etchings—which required nearly seven lineal miles of picture frame.

One of several dining rooms is so large that it comfortably seated 4,700 people on the occasion of a banquet given in honor of Colonel Charles A. Lindbergh. There are six halls in which dancing is provided; in the grand ballroom 3,000 people may dance comfortably at one time. To care for cases of sudden illness, there is on the roof a two-ward hospital, completely equipped. On lower floors there are a number of recreation rooms, where guests may check their children and leave them under competent supervision; a library of 10,000 volumes; a "menagerie" room, where a guest who travels with a pet animal—from a cat or dog to a monkey or a bear—may have it cared for, and the hotel supplies a chef, delegated to cook for it.

The plant for generating electricity is large enough to meet the needs of 12,000 city homes, and the seven huge boilers in a sub-basement are sufficient to run, at full pressure, as many generators as would be required to supply street lighting for a city of 250,000 inhabitants. The refrigerating system can supply 300 tons of ice each day; if it is a question of heat, the 5,000 radiators have sufficient heating surface to make comfortable 500 five-room bungalows.

seventy-five stories in height and more floor space than that possessed by any other structure in the world, indicates the possibilities offered by air rights.

[In these volumes, see the article AIR RIGHTS, where will be found illustrations of two buildings mentioned above.]

Construction Difficulties. Perhaps the most impressive fact to builders in connection with the city's mammoth structures is the effort and expense necessary to make them firm and

safe. The soil that underlies the city is an unstable mixture of sand, gravel, and blue clay, and it is necessary to sink great shafts of steel and concrete down to bed rock as far as 110 feet below the surface, in order to make the foundations secure.

The Park System. Chicago is far from being the first city of the country in its proportion of park area to population, but it has an unusually well-planned system of beautiful



PLAZA EXTENDING FROM MICHIGAN AVENUE TO THE LAKE

Photo U & U

The Buckingham Memorial Fountain is seen in the distance in the great central plaza; the Shedd Aquarium is shown in the upper right of the illustration.

parks, in total area over 5,000 acres. Because of its large and small parks and general landscape beautification, it is known as the "Garden City."

Of the two score, or thereabouts, of parks, seven are of considerable extent. Lincoln Park, on the North Side, has an area of 881 acres, but is being largely added to by the creation of new land on the lake shore at its northern limit. This is the favorite park of the children, who are attracted not so much by the beautiful shaded drives, the conservatory, or the lagoon as by the zoölogical garden. About 1,700 animals, one of the finest collections in the country, are housed here, some of them in buildings which are models in their way. Most noteworthy of the statucs with which Lincoln Park is liberally adorned are the equestrian statue of Grant and the famous *Lincoln* by Saint Gaudens.

On the South Side the most important parks are Jackson, with 554 acres, and Washington, with 371 acres. The former, stretching for one and one-third miles along the lake, was the site of the World's Columbian Exposition. Beautiful drives, lagoons for boating, a rose garden, and excellent golf and tennis facilities have made this one of the city's most popular parks. A mile west of Jackson Park, and connected with it by the boulevard remembered as the Midway Plaisance of the World's Fair, is Washington Park, especially noted for its effective landscape gardening. The third large park on the South Side is Marquette, one of the newer playgrounds, with an area of 322 acres, much frequented by reason of its long golf course. Downtown, between Michigan Avenue and the lake, is Grant Park, already mentioned, whose area is 303 acres. It was once known as Lake Front Park. The great central plaza is pictured on this page.

The largest west side parks are Humboldt, 1,057 acres; Garfield, 187 acres, noted for its conservatory, the largest in the country; and Douglas, 182 acres. Connecting the various parks is a splendid system of boulevards, aggregating over 130 miles and forming one of the finest drives in America. Most of these are lined with beautiful homes and some of them contain central grass plots decorated with trees and flowers. The people of Chicago also have the benefit of the natural parks or woodland regions which have been purchased and opened up by the Cook County forest preserve board. These lie in a semicircle about the city, and are all easy of access.

The "Outer Drive." For many years the city ignored the possibilities of driveways along the lake front. In 1920 the Michigan Avenue bridge was opened and the avenue itself was widened, to connect the north park system with the Loop district. For about two miles along the lake on the North Side a driveway existed, and extensions have been added for several miles farther north. There now exists a fine, wide boulevard system from the Loop northward through the North Side and the lake-bordered suburbs to Waukegan, a distance of forty miles, and beyond that city, with roads nearly as wide, to the city of Milwaukee. Lake Michigan is visible for nearly the entire distance. The greater part of this highway is known as Sheridan Road.

In 1925 improvements were undertaken to construct as notable an outer drive on the South Side. This was named the Leif Ericsson Drive. It was completed along the east side of Grant Park, close to the shore of the lake, in 1926, extended to 23rd Street during the next year, and to Jackson Park in 1929. When fully completed, by the year 1932, the outer drive system in Chicago proper will extend

from Evanston on the north to the Indiana state line on the south. Near the mouth of the river, a bridge costing \$8,000,000 is the connecting link between the outer drives.

Playgrounds and Beaches. One of the things of which Chicago has most reason to be proud is its system of small parks. These are so located as to be accessible to the people who need them most—those in the thickly settled districts; and they contain practically all that visitors of any age can demand for pleasure or relaxation. There are gymnasiums with trained instructors, swimming pools, fully equipped playgrounds for children of various ages, sand piles, wading pools, skating ponds, reading rooms, and club rooms, all free. In the summer season, thousands seek the bathing beaches which may be found at intervals along the lake front, from the northern section of the city to the south end.

Libraries. Of more than a score of libraries in Chicago, the largest and most popular is the Public Library, which dates from the years immediately following the great fire of 1871. It has over 1,500,000 volumes, and the annual circulation is over 12,000,000 volumes. One of the most beautiful and complete library buildings in the country houses this collection, and there are more than forty branches in different parts of the city. The other two large libraries are the Newberry and the John Crerar, the former occupying an imposing granite building on the North Side, the latter housed in its own building on Michigan Avenue. These are both reference libraries, and their books are not for circulation. The Newberry collections are especially valuable on such subjects as literature, history, music, and genealogy, while the John Crerar specializes in the natural, physical, and social sciences.

Schools and Other Institutions. Chicago has a complete system of public schools, ranging from the kindergarten through the grammar grades and high schools to the Chicago Normal College, with its three practice schools for teachers. In the twenty-four high schools, fourteen junior high schools, and more than 300 grammar schools there are enrolled almost 525,000 pupils, and the teaching force numbers over 12,500. The regular school term is ten months, and during half of that time night schools are also conducted, their enrollment averaging about 40,000, for which there is an annual appropriation of nearly \$500,000. There are schools for the blind, the deaf, and the crippled, and in certain schools special classes are held for sub-normal children. Many of the high schools and more than half of the grammar schools include manual training in their courses, and domestic science teaching is becoming increasingly important.

Of institutions of higher learning, the University of Chicago is the most prominent. This

is one of the most heavily endowed universities in the world. Northwestern University, one of America's greatest Methodist institutions, located at Evanston, has its professional departments of law, medicine, dentistry, and the college of commerce in the city, on the McKinlock Campus, at Chicago Avenue and the Lake Shore Drive; and there are, in addition, Saint Ignatius College, Loyola University, Lewis Institute, twenty-nine medical schools, McCormick Seminary, and other excellent theological schools. Crane College, formerly the Crane Technical High School, is one of the few schools of college rank in the United States that are municipally supported. The Art Institute, which has in attendance upon its classes about 2,500 students each year, has been mentioned above. Few other art schools in the country offer as complete courses.

There are about 1,200 churches of all denominations, and nearly ninety hospitals, the most noted being the Cook County, the Presbyterian, and Saint Luke's. In Hull House (which see) the city has one of the best-known social settlements in the world, with Miss Jane Addams at its head; others which have won a wide reputation are Chicago Commons, Northwestern University Settlement, and the University of Chicago Settlement. The United Charities and the Jewish Aid Society maintain corps of trained investigators whose duty it is to discover the needs of the poor and unfortunate, and to see that aid is furnished them. There are also smaller charitable organizations, many of which have specialized in some particular field.

Administration. A mayor, elected for a term of four years and paid \$18,000, the second highest salary of any municipal officer in America, is the chief executive, and he is assisted by a council of one chamber, composed of fifty aldermen, one from each of as many wards. Certain department heads, as the chief of police and the fire chief, are appointed by the mayor and go out of office with him, but throughout the departments themselves, civil-service methods prevail. The total revenue and expenditures of the city amount to about \$210,000,000 annually.

How the City Gets Its Water. Lake Michigan furnishes an inexhaustible store of water. To bring into the city and distribute almost 900,000,000 gallons used daily, an intricate system of cribs, lake and land tunnels, and pumping stations has been constructed. From two to four miles out in the lake there are five cribs, with which connect nine tunnels well below the bottom of the lake, and these in their turn convey the water to ten main land tunnels. Some of the lake tunnels are fourteen feet in diameter.

The most important thing about drinking water is that it shall be pure, and of course it



Photos: U & U

Educational Monuments. Billings Memorial Hospital, on the campus of the University of Chicago, is shown above. Below, on McKinlock Campus, at Chicago Avenue and Lake Michigan, is this great group of professional buildings of Northwestern University.

cannot be if impure matter in great quantity is dumped into the lake. Despite this fact, all the sewage of the city for a long time found its way into the lake, but by 1875 it became clear that some other method of sewage disposal must be found if the health of the city were not to suffer. Attempts were made to use the old Illinois and Michigan Canal, but this proved inadequate, and between 1892 and 1900 the Chicago Drainage Canal, one of the finest sanitary works in the world, was built. By means of this the vast volume of sewage of the city finds its way through the Chicago River and the Illinois River to the Mississippi, and so to the Gulf of Mexico.

Local Transportation. In so widely scattered a city, with its centralized business, transportation is a big problem, and one which has been met in three ways. First, there are the electric street railways, which have over 1,350 miles of track, and connect all parts of the city. No city in the United States possesses a better street-railway system. In the management of the surface lines the city is a partner, receiving fifty-five per cent of the net profits; this sum now amounts to over \$50,000,000, the accumulation of years, and it is being held to finance at no distant day a system of subway transportation. A fine system of motorbus lines serves many parts of the city, and a dozen lines radiate from the city in interstate transportation.

There are four elevated roads, two to the West Side, one to the South, and one to the North; those which run west and north also serve suburban communities. In the downtown district these form a "loop" about the main business section, enclosing the streets from Lake to Van Buren and from Wabash to Wells Street, and it is this which gives the popular name "Loop" district to this section. The Loop encircles the great retail and wholesale stores.

In addition to these purely local lines, most of the great railways entering the city have suburban divisions; in 1926 the Illinois Central suburban system was electrified. In all, it is estimated that the local lines collect daily an average of more than 1,500,000 fares. Besides

the above, three high-speed electric systems run trains to Milwaukee on the north, Joliet and Aurora on the west, and to Gary and South Bend, in Indiana, from stations in Chicago.

The World's Greatest Railway Center. Chicago stands supreme as a railroad center. No railroad passes through Chicago, for every train that runs into the city enters a terminal; and the twenty-seven main lines terminating there have a combined mileage which is half that of all the railroad systems of the United States. It is believed that the number of railways centering in



Photo U & W

THE UNION STATION

Both buildings shown are units in the great station, which is one of the finest in the world. All trains are beneath the level of the streets.

the city will never be increased, unless new roads lease right of way over lines already existing, as there is no room for another road-bed, except at such enormous cost as to be prohibitive. Most of those already entering the city are unpleasantly crowded in the hours when local traffic is heavy. Six large stations accommodate the passenger service; one of these, a great new Union Station, was opened for service in 1926, equaling any found elsewhere in the world. A belt line extends almost around three sides of the city, connecting the different roads and forming a complete freight-transfer system.

The entrance into the city of so many great railways made necessary very dangerous grade crossings, but beginning in 1892 these were in large measure done away with by the elevation of tracks, at a cost of a million dollars a mile. To-day Chicago has within its limits more than twice as many miles of elevated track as have all the other cities of the United States together.

America's Airport Center. Chicago is regarded as the nation's gateway connecting the East and the West, although it is hundreds of miles east of the center of the continent. It is only about fifteen miles west and north of the country's center of industry. Naturally, then, the rapidly growing demand for airplane transportation of passengers, freight, and express has brought the city rapidly to the front as an airport center, and it is destined to hold supremacy in airports and air transportation.

Chicago has already seventeen permanent airports, of which the Municipal Airport, near

the southwestern extremity of the city, is the largest. Its land value is \$10,000,000, and nearly \$250,000 has been added in buildings and improvements. The Maywood Flying Field is the center of air-mail activities. The Ford Airport, about twenty-five miles south of the Loop, is becoming more important every year. These are the largest and most important of the air terminals.

The city has nearly twenty schools of aviation; it has more than fifteen air-taxi and sight-seeing services, and within the city limits are nine airplane manufacturing plants.

Commerce and Industries. Naturally, a city that is the greatest railroad center in the world might be supposed to have a large rail commerce. It has that, and more; it is one of the greatest of inland ports, lines of steamers, both freight and passenger, connecting with all the other important lake ports. Over 6,000 ships a year enter and leave local harbors; these deposit 14,500,000 tons of freight and bear away an equal amount. The city is a sort of clearing house; it does not keep all that is brought into it, but reships much of it. The iron, which constitutes over fifty per cent of the weight of its lake imports, it makes use of in its great suburban steel mills, but much of the lumber and grain that arrives is shipped again, Chicago ranking as one of the greatest grain markets in the world. It is also first in its export of packing-house products. Among the cities of the United States, only New York surpasses Chicago in the volume and value of its trade.

Docking facilities for years were inadequate, and partly to remedy this condition, a great Municipal Pier, near the mouth of the river, was completed in 1916. In 1928 its name was

changed to Navy Pier, to do honor to the American boys who served in the navy during the World War. It is built of concrete and steel and extends over half a mile into Lake Michigan. At its farther end, there is space for a recreation center 660 feet long and 300 feet wide, which has easily accommodated 100,000 people in a single day. The pier cost \$4,500,000.

With the coal fields of Illinois so near and the raw materials from the great Middle West so easily available, Chicago has become an important manufacturing center. The total value of manufactured products is over \$3,500,000,000 annually. Largest of the industries is that of slaughtering and meat-packing, carried on at the Union Stockyards, by far the greatest establishment of its kind in the world. To quote the popular statement, "Every part of the animal is used but the squeal," and to-day the by-products, made from parts that were formerly thrown away,

reach a value of scores of millions of dollars each year; the entire value of the annual output of the stockyards is about \$580,000,000. Iron and steel products, machine-shop and foundry products, electrical equipment, men's clothing, railroad cars, and lumber products are manufactured in vast quantities. Printing and publishing is an important industry, though in this regard Chicago is second to New York and above Philadelphia. It totals \$400,000,000 a year, including the printing of newspapers.

History. Interest in the history of Chicago centers in its growth, remarkable even among American cities. Other cities have had "booms," but Chicago's expansion has been continuous. Attempts have been made to prove that the name *Chicago* is from an Indian word meaning *mighty*, or that it has some poetic or high moral significance, but the general opinion is that it is a form of the Indian name for the everywhere-present wild onion. The first white visitors to the site were Marquette and Joliet, who stopped there in 1673. In 1779 a negro from San

(Continued on page 1366.)



CENTRAL AERIAL BEACON

In the heart of the "Loop," surmounting the 37-story Roanoke Tower. The two beacons are of 8,000,000 candle-power each, and can be seen by aviators at a distance of 100 miles. Below the beacons, in the pyramidal tower, are clusters of red neon lamps.

Photo P & A

OUTLINE AND QUESTIONS ON CHICAGO

Outline

I. Position and Size

- (1) Latitude, $41^{\circ} 53' 6''$ north
- (2) Longitude, $87^{\circ} 38' 1''$ west
- (3) Situation on Lake Michigan
- (4) Distance from other large cities
- (5) Area
- (6) Population
- (7) Rapid growth

II. Description

- (1) Plan of city
 - (a) Determined by Chicago River
 - (b) The business section or "Loop"
 - (c) Important streets
- (2) Notable buildings
 - (a) Public
 - (b) Office buildings
 - (c) Hotels
 - (d) Theaters
- (3) The park system
 - (a) "The garden city"
 - (b) North Side parks
 - (c) South Side parks
 - (d) West Side parks
 - (e) Playgrounds and beaches
 - (f) The Outer Park plan
 - (g) The "City Beautiful"
- (4) Educational institutions
- (5) Churches
- (6) Charitable institutions

III. Water Supply and Sewage

- (1) Cribbs
- (2) Tunnels
- (3) Amount of water used daily
- (4) Drainage Canal

IV. Transportation

- (1) Railway systems
 - (a) Greatest railway center
 - (b) Elevation within city
- (2) Local transportation
 - (a) Street railways
 - (b) Elevated roads
 - (c) Motorbus transportation

V. Commerce and Industry

- (1) Rail commerce
- (2) Lake commerce
- (3) Docks
- (4) Manufactures

VI. The People

- (1) Nationalities represented

VII. Government and History

- (1) Departments of government
- (2) Revenue
- (3) History
 - (a) Settlement
 - (b) Growth to 1870
 - (c) The great fire
 - (d) Later growth

Questions

- What great air beacon is located in the downtown district?
 What is the meaning of the name *Chicago*?
 How are "air rights" utilized?
 How many gallons of water are used in the city each day?
 What is the largest foreign-born element in the city?
 Show that Chicago is not geographically a Western city.
 How does it rank as to size among the world's cities?
 What was the greatest calamity that ever befell the city?
 What engineering project has changed the course of a river?
 How have architects overcome the former limitation in building heights?
 What is the "Loop"? Why is it so called?
 Why is it unlikely that any more railroads will ever terminate in Chicago?
 What building in the city is half a mile long? What double purpose does it serve?
 Mention three pieces of statuary of which the city may feel justly proud.
 What provision does the city make for the recreation of its people?
 What is the greatest industry? Do any cities surpass it in this?
 For what purpose was the Chicago Drainage Canal constructed?



Photos: Visual Education Service

In Earlier Days. (1) Wolf's Point in 1832. (2) Stage coaches arriving and leaving their headquarters before 1850; the route was to Galena. (3) Chicago in 1845, viewed from the prairies on the west. (4) The old Kinzie House, on Chicago River, a few rods from the lake, in 1832. (5) Mrs. O'Leary's house; in her barn, in October, 1871, the great Chicago fire started.



SOUTH WATER STREET IN 1834

Domingo built a cabin on the north bank of the Chicago River, and in 1804 this came into the possession of John Kinzie, the first white man to make his home on the site of the city. The Federal government in 1804 built Fort Dearborn on the south bank of the river, and though this was abandoned when the Indian massacre of 1812 occurred, it was rebuilt four years later. In 1830 maps were made, definitely marking out the town of Chicago, which had a total area of three-eighths of a square mile and contained twenty-seven voters. When incorporated, three years later, the town had a slightly increased area and a population of 550, while its tax levy reached the total of \$48.00. The first city water works, constructed in 1834, consisted of a well that cost \$95.

From this time on the growth was steady, if not particularly rapid. The Illinois and Michigan Canal, begun in 1836 and completed in 1848, and the Chicago & Galena Union Railroad, which later was the nucleus of the great Chicago & North Western system, brought the little city into touch with the territory to the west, the territory upon which its prosperity was to depend; and the population increased from 4,480 in 1840 to almost 300,000 in 1870. The city's first and greatest calamity occurred in 1871; a terrible fire broke out on October 8 on the West Side, extended north and west, and raged for two days and nights, destroying property valued at \$196,000,000 and rendering 100,000 persons homeless. With wonderful rapidity the city was rebuilt, the old wooden structures being replaced in large measure by those of brick and stone.

In its later history Chicago has suffered much from labor troubles. Out of these grew the

Haymarket Riot of 1886, in which seven policemen were killed. Serious strikes have occurred at intervals in the stockyards, but most noteworthy of these movements were the railway strike in 1894, put down only with the aid of Federal troops, and the teamsters' strikes of 1904-1905. An event of more pleasing character was the World's Columbian Exposition of 1893, the greatest world's fair held up to that time. On December 30, 1903, there occurred in the Iroquois Theater a fire in which 572 lives were lost, and as a result of this disaster, theaters not only in Chicago but all over the world have been built and equipped with more thought of safety.

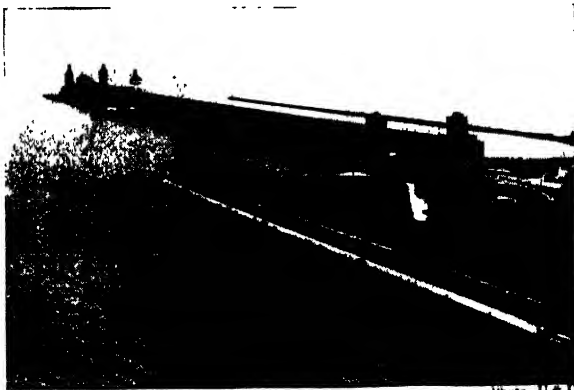
In Chicago another world's fair will be held in 1933, to commemorate the hundredth anniversary of its founding. The city has always been a favorite meeting place for conventions, and among others held there were the national conventions at which Lincoln, Grant, Garfield, Blaine, Cleveland, Harrison, Bryan, Roosevelt, Taft, Hughes, and Harding were nominated for President of the United States. J.E.V

Related Subjects. The reader is referred in these volumes to the following articles

Chicago Drainage Canal	Fort Dearborn
Dearborn, Henry	Meat and Meat Packing
World's Columbian Exposition	

CHICAGO, UNIVERSITY OF, one of the leading

institutions of higher education in the United States. It is located in Chicago on the Midway Plaisance, and has over thirty buildings in the Gothic style which are unsurpassed on any campus in the country. The total number of buildings is over forty, including the Yerkes Astronomical Observatory



NAVY PIER

Photo. U & W

at Lake Geneva, Wisconsin. This is the newest of the great universities, though in its

antecedents it dates from the middle of the nineteenth century. The old University of Chicago, a Baptist school of college rank, was opened in 1857, but was compelled through lack of funds to surrender its charter in 1886. Four years later, largely through the efforts of the American Baptist Educational Society, the new university was opened, and though it is in no sense a denominational institution and exacts no religious tests of students or teachers, its charter provides that two-thirds of the trustees must be Baptists.

Organization. The university thus chartered in 1890 is organized into four divisions: (1) schools and colleges, including the four-year undergraduate courses, as well as the graduate schools; (2) university libraries, laboratories, and museums; (3) the university press; (4) university extension, which directs the work of students unable to attend classes at the university.

In arranging its courses, the university mapped out a plan differing from that of any other American school. The scholastic year is not the usual period of nine months, but is divided into four quarters, each of which is subdivided into two terms. The summer quarter, at some universities a vacation period, is at the University of Chicago the busiest quarter of the year; students are attracted from all parts of the country, for in three summer quarters they can complete an ordinary year of college work.

Growth. Though many benefactors have given liberally to the university, its growth has been largely due to the bequests of John D. Rockefeller, who at various times contributed sums totaling about \$35,000,000. William Rainey Harper, president from its foundation to 1906, developed a policy which attracted students from every part of the Union. Under his successor, Harry Pratt Judson, who retired in 1923 (died in 1927), the student body largely increased in number, the material resources of the university more than doubled, several of the most beautiful buildings were erected, and its prestige and influence greatly enhanced. Judson's successor, Prof. Ernest DeWitt Burton, head of the Department of New Testament and Early Christian Literature, died in the month of May, 1925. His successor, Dr. Max Mason, formerly a professor at the University of Wisconsin, served but three years, when he joined the Rockefeller Foundation. Mason was succeeded by Robert Maynard Hutchins in 1929.

Some years ago plans were announced whereby the university would in the future possess one of the greatest medical departments in America. Rush Medical College, long affiliated with the university, and the Presbyterian Hospital, on Chicago's West Side, formed the nucleus of a great post-graduate department;

a new graduate school of medicine was completed on the Midway campus in 1927. In 1928 the university received an endowment fund for the construction of dormitories.

CHICAGO DRAINAGE CANAL, officially known as the CHICAGO SANITARY AND SHIP CANAL, a great sanitary project to provide pure water for the millions of that city. Ages ago the Great Lakes found an outlet to the ocean by way of the Illinois and Mississippi rivers, and the channel through which this great stream flowed forms the valley of the Illinois River. When Chicago discovered that it must protect Lake Michigan from the insanitary effect of its sewage, the city engineers turned their attention to the ancient water course. A brief examination showed that a canal connecting the lake with the Desplaines River could be constructed without engineering difficulty. The necessary legislation was obtained, and the great channel, commonly known as the Chicago Drainage Canal, was begun September 3, 1892, and completed in January, 1900, at a cost of about \$50,000,000.

The canal proper is twenty-eight miles long, and varies in width in different sections from 110 feet at the bottom and 108 feet at the water line in the narrowest section to 202 feet and 290 feet in the widest section. The sections cut through rock have a width of 160 feet at the bottom and 162 feet at the top. The depth of the cut varies from thirty to thirty-six feet; the depth of water is never less than twenty-two feet, and is usually about twenty-four feet six inches. By means of the controlling works at Lockport, twenty-nine miles inland, consisting of flood gates and a beartrap dam, the depth and flow of water are easily regulated. Ordinarily the flow is about 300,000 cubic feet per minute, but the full capacity of the canal is 600,000 cubic feet per minute.

The Chicago Drainage Canal is one of the greatest engineering works in the world. It has changed the course of the Chicago River and made it an outlet of Lake Michigan, when formerly it flowed into the lake; it is the only river in the world whose flow is away from its mouth. In connection with the construction of the canal, the entire sewage system of Chicago had to be changed. Formerly, all sewers emptied into the lake; now they empty into the canal, and the water supply of the city has been saved from pollution. In the near future, the canal will doubtless form a link in a deep waterway between the Great Lakes and the Gulf of Mexico.

In 1924 and 1925 states bordering on the Great Lakes joined the government of Canada in protesting that the Drainage Canal had lowered lake levels and seriously impaired navigation. When, in 1929, the level of the lakes rose more than two feet, it was shown that natural causes alone were responsible for

various levels recorded. However, in 1929, the Supreme Court of the United States declared that within reasonable time the flow should be reduced to the requirements of navigation. This decision requires the city to provide vast sewage-disposal plants.

CHICAGO HEIGHTS, ILL. See ILLINOIS (back of map).

CHICAGO RIVER. See CHICAGO (Ill.).

CHICAREE, *chik' a re*, the red squirrel. See SQUIRREL, subhead.

CHICHAGOF, *chik' ha gahf*, an island off the coast of Alaska (which see).

CHICKADEE, *chik' a de*. See TITMOUSE.

CHICKAMAUGA, *chik a maw' gah*, BATTLE OF. See WAR OF SECESSION.

CHICKASAW. See INDIANS, AMERICAN (Most Important Tribes.)

CHICKASHA, *chik' a sha*, OKLA. See OKLAHOMA (back of map).

CHICKEN HAWK. See GOSHAWK.

CHICKEN POX, a contagious disease common among children, characterized by an eruption somewhat like that of smallpox. The two diseases, however, are otherwise very different; chicken pox is rarely dangerous, and smallpox vaccination is not effective in preventing it. Fever is usually present twenty-four hours before the appearance of the eruption, and there may be vomiting, restlessness, and slight pains in the legs and back.

Red pimples break out first upon the face, scalp, neck, and later upon the limbs and back. They come in "crops," new blotches appearing while the older ones are maturing. In from twelve to twenty-four hours these pimples are filled with a thin fluid, which is not apt to become pus if kept from infection. By the fourth or fifth day crusts form, which fall off a few days later. The fever ranges from 100° F. to 102° F., falling to normal after the first two or three days.

The body of the patient should be sponged each day, and the crusts should be kept oiled. A 1:40 solution of phenol is a good preparation for sponging. It may be obtained at a drug store. Scars will not form if rules of cleanliness are observed and scratching is prevented. The patient must be kept quarantined until all the crusts have disappeared, as the disease is very contagious.

CHICLE, *chik''l*, the gumlike, milky juice of the sapota tree, or *sapodilla* (*Achras sapota*), an evergreen tree native to tropical America. Chicle is used extensively in the manufacture of chewing gums. It is secured by tapping the trunks of the trees, a process used also in obtaining sap from the sugar maple and a milky liquid from the rubber tree. The milky juice is coagulated by boiling, the coagulated mass then being kneaded to press out the water. The gum comes on the market in lumps weighing twenty to thirty pounds.

Chicle is obtained only during the rainy season, when the sap is flowing. Trees, once tapped, require five years to recover from the injury, and a large percentage never recover. New areas are needed constantly to supply the demand. A large chicle-importing firm is supporting an investigation, hoping to find more effective methods of chicle production.

The United States imports millions of pounds of chicle yearly. British Honduras and some parts of Mexico and of Guatemala are the chief sources of chicle. The finest quality comes from near Lake Hzá, Guatemala. G.M.S.

[The process of making chewing gum is described in these volumes under the title GUM, CHEWING.]

CHICOPEE, *chik' o pe*, MASS. See MASSACHUSETTS (back of map).

CHICORY, also called SUCCORY, is a weedy plant whose root is commonly used as a substitute for coffee. Chicory is native to Europe



Photo Visual Education Service

CHICORY

and Asia, but is now cultivated and found wild in the United States and Southern Canada. It has a fleshy root, spreading branches, coarse leaves, like those of the dandelion, and bright-blue, sometimes pink or white, flowers. The long, fleshy, milky root has for years been dried, roasted, and ground and used for adulterating coffee, but in the United States pure food laws forbid such use of chicory without proper

notification on the label. Chicory may easily be detected in coffee by putting a spoonful of the mixture into a glass of clear, cold water; the coffee will float on the surface and the chicory will separate and discolor the water as it precipitates. In Europe chicory is valued as a salad plant, and is also grown for fodder. In some sections the young, tender roots are cooked for table use.

B.M.D.

Scientific Name. Chicory belongs to the family *Compositae*. Its botanical name is *Cichorium intybus*.

CHIEF JUSTICE, the title given to the head of a court consisting of a number of justices or judges, such as the Supreme Court of the United States or a state supreme court. In the former, the Chief Justice receives his appointment as such. In most states, the member of the court whose term expires first serves as chief of the court; if there are five judges, and the term of service is ten years, each judge is chief during his ninth and tenth years.

CHIEF OF STAFF. See **GENERAL STAFF**.

CHIFFON, *shif' on*, a very soft, thin, gauzy material used for dresses, scarfs, veils, trimmings, and various dainty garments for women. Made of fine, hard-twisted silk yarn, the better qualities of chiffon are beautiful for evening wear. Cotton chiffons are also made,

and chiffon ribbons are popularly used by florists to decorate bouquets of flowers and plants. Chiffon lace is chiffon embroidered with silk, and chiffon velvet is a soft pile fabric with an extraordinary sheen.

The name *chiffon* is French and means *rag* or *flimsy cloth*, and in that language is used to suggest anything decorative worn by women.

CHIGGER, *chig' ur*, another name for jigger (which see).

CHIGNECTO, *shignek'toh*, **BAY**, on the Bay of Fundy, the location of tides which sometimes rise more than fifty feet. See **FUNDY**.

CHIGNON, *shin' yahn* (in English). See **HAIRDRESSING**.

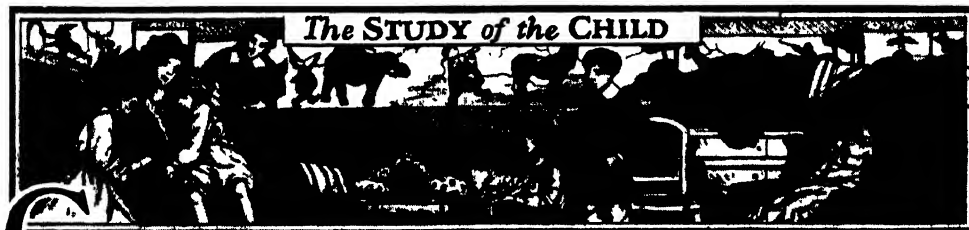
CHIGOE, *chig' o*, another name for jigger (which see).

CHIHUAHUA, *che wah' wah*. See **MEXICO** (Principal Cities).

CHILBLAIN, *chil' blane*, a condition characterized by stinging, itching, and burning, and sometimes by redness. It affects particularly the skin of the feet. Induced primarily by exposure to cold, or cold and wet, the feet become sensitive to cold, and attacks recur on slight provocation. See **FROSTBITE**.

Treatment. Avoid exposing the feet to cold and wet. Avoid light shoes. Heavy stockings should be worn in cold weather. Bathe the feet daily in cold salt water. Then apply kerosene.

W.E.A.



CHILD, THE. Parents of the twentieth century take better care of their children than did the parents of preceding generations, simply because they know better how to do it. The rearing of children, together with every other field of human endeavor, has been invaded by the scientific spirit. By studying children individually and in groups, statistics and tables have been gathered which enable us to know with some accuracy what we have a right to expect of the normal child and how to go about to secure it. The facts so far assembled are not final, by any means; as more children are studied, modifications and changes are bound to be made. But the account of the development of the child which follows represents some of the knowledge which is now at hand.

The Development of the Child. In the beginning the human body consists of a single

cell. When this cell begins to grow, it divides into two cells; each of these divides in its turn into two more, and so on, until that ever-new marvel, a tiny human being, is formed. By weighing and measuring hundreds of thousands of babies, it has been found that the average baby boy, at birth, weighs about 7.3 pounds; the average baby girl, 7.1 pounds. The boy baby should be about 19.68 inches tall; the girl baby, 19.48 inches. In six months the average baby doubles its weight; in a year he trebles it. So a year-old child should weigh about twenty-four pounds. By the sixth year the average boy weighs about forty-five pounds, the average girl about forty-three, and the boy should be just a trifle over, the girl just a trifle under, forty-four inches in height.

The first table below shows a child's increase in weight and height from the age of six and one-half to sixteen and one-half years:

AGE	BOYS			GIRLS		
	AVERAGE IN LBS.	ANNUAL INCREASE	PER CENT OF INCREASE	AVERAGE IN LBS.	ANNUAL INCREASE	PER CENT OF INCREASE
6½.	45.2	43.4
7½.	49.5	4.3	9.5	47.7	4.3	9.0
8½.	54.5	5.0	10.1	42.5	4.8	10.0
9½.	59.6	5.1	9.3	57.4	4.9	9.3
10½.	65.4	5.8	9.7	62.0	5.5	9.6
11½.	70.7	5.3	8.1	60.5	6.6	10.5
12½.	76.9	6.2	8.7	78.7	9.2	13.2
13½.	84.8	7.0	10.3	88.7	10.0	12.7
14½.	95.2	10.4	12.3	98.3	9.6	11.9
15½.	107.4	12.2	12.8	106.7	8.4	8.5
16½.	121.0	13.6	12.7	112.3	5.6	5.2

The second table, giving heights in inches, is made up from the measurements of American-born children in three American cities; in common with Canadian children, they are a little taller and heavier than the average English, Irish, German, or Scandinavian child:

no way of measuring accurately how fast or how far a child progresses in these first years, but we do know that he is learning to use all of his senses, that he has a constant and insistent desire to touch, taste, and handle everything around him; that he is pleased with

Years . . .	6	7	8	9	10	11	12	13	14	15	16	17
Boys.	44 10	46 21	48 16	50 00	52 21	54 01	55 78	58 17	61 08	62 06	65 58	66 20
Girls. . .	43 06	45 04	48 07	49.61	51 78	53.79	57 10	58 75	60 32	61 30	61 72	61 90

The Development of the Senses. In a well-known book called *The Biography of a Baby*, Miss M. W. Shinn describes the state of a new-born baby thus:

She took in with vague comfort the gentle light that fell on her eyes, seeing without any sort of attention or comprehension the moving blur of darkness that varied it. She felt motions and changes; she felt the action of her own muscles, and after the first three or four days disagreeable shocks of sound now and then broke through the silence, or perhaps through an unnoticed jumble of faint noises. She felt touches on her body from time to time, but without the least sense of the place of the touch . . . From time to time sensations of hunger and thirst, and once or twice of pain, made themselves felt through all the others, and mounted until they became distressing; from time to time a feeling of heightened comfort flowed over her as hunger or thirst was satisfied. . . . For the rest, she lay empty-minded, neither consciously comfortable nor uncomfortable, yet on the whole pervaded with a dull sense of well-being. Of the people about her, of her mother's face, of her own existence, of desire or fear, she knew nothing.

The preceding paragraph from Miss Shinn's book is only an imaginative way of saying that a baby, although it is not born with its eyes closed, like a kitten, does not *see*; it does not *hear*, or *smell*; it does not *think*; it *feels* only vaguely and unconsciously. And yet, in this animal-like little being all the elements of the future man or woman are present, and its growth and development during the first years of its life are truly marvelous. We have

bright and beautiful colors; that he is alert to pleasant sounds and sensitive to harsh ones; that he acquires very positive likes and dislikes about the food he eats; and that he develops a liking for pleasant odors and a distaste for those that are unpleasant.

This is exactly as it should be, for a child lives by his senses. They are his only way at first of acquiring knowledge of any sort. They furnish all the material his mind has to work with. If his senses are not satisfied, his mind will starve; if they are not developed, his mind will not develop. It is important, therefore, that from the second month on, when the senses begin to be active, plenty of material be furnished for stimulating and developing each sense.

Smell and Taste. It is practically impossible to test a baby's sense of smell, but it is quite probable that this sense does not develop rapidly. Tests made of a new-born baby seem to prove, however, that the sense of taste is active from the first—that there is a dislike for sour and bitter things and a liking for sweets. It is very desirable that this sense of taste should be wisely developed, because a child's enjoyment of simple and wholesome food depends largely on it. As soon as a child begins eating solid food, he should be encouraged to like the things which are good for him and to dislike those which are unwholesome. It may be mentioned, too, that children should be encouraged to be thirsty, for their bodies need

a great deal of water. Every baby should be given plenty of water to drink, and older children should be encouraged to drink large quantities of it.

Hearing. A new-born baby is deaf, usually because the inner ear is full of mucus, and it remains deaf for several days. But if loud noises are not heard by a baby by the end of the fourth week, he should be taken to a physician. Ordinarily, after three or four days the baby becomes very sensitive to sound, and starts and trembles if a door is slammed or someone speaks loudly. A sneeze or a whistle will also cause a violent reaction. Music and sound are such important factors in the growth of children that no child ought to be brought up without having the opportunity to hear soft, sweet sounds. His interest in such sounds should be encouraged and stimulated, and training in music should be begun early. The kindergarten admirably provides both the music and the rhythm in which children delight.

Dermal Senses. By dermal senses we mean the sensations in the skin. Babies quickly note the difference between things warm and cold. A baby a week old will cry if he is put into a bath that is a few degrees colder than the one to which he is accustomed. This should be remembered by the person who prepares his bath. The hand of an adult is not sensitive enough for testing the temperature of the water. A thermometer should be used, or, failing that, the elbow. The mucous membrane of a baby's mouth and throat is much more tender than that of a grown person. Food which is merely warm to an adult will seem disagreeably hot to a baby or small child. Anyone who has observed children will realize how indifferent the average child is as to whether his food is more than warm, and a

mother's admonition, "Now eat your soup while it is nice and hot," is usually enough to make the child push his plate away and wait until it cools.

Touch. Up to the third month, the average baby has done nothing but aimlessly grasp with his hands, which he holds habitually with the thumb inside the palm. But after the second month, he may be given every sort of object to handle which will not do him injury.

As he grows older, the more objects he has—hard and soft, rough and smooth—to play with, the faster will his sense of touch develop. The ordinary toys babies are given may be supplemented by the many objects the ordinary household provides—clothespins, empty spools, napkin rings, spoons, etc. If the baby cannot handle the objects he sees, his knowledge of them will be imperfect.

Sight. The eyes of a new-born baby are closed most of the time. The reason that some babies are so wakeful at night is undoubtedly due to the fact that the darkness is pleasanter to their eyes than daylight. They prefer to sleep when it is light and to lie

awake in the dark. The eyes of a tiny baby will close if a light is brought near them, but after a few days he will turn his head toward a window or a light, and after a few weeks, light will give him pleasure. By the end of two weeks the eyes, which do not at first coördinate, will begin to follow objects, and at the end of eight or nine weeks, a baby will stare at an object for minutes at a time. By the seventh month he will distinguish faces by staring at strangers and smiling at friends, will turn his head toward a person leaving the room, and follow with his eyes objects dropped from his hand. All of these developments are of interest to parents.



THE PRAYER

Sculpture by Jean Dampit, in the Luxembourg Galleries, Paris.

Muscular Control. At birth a child has no power to make voluntary movements of any sort. When he moves an arm or a leg, when his eyes close at a bright light, or when he starts at a loud sound, the movement is a total surprise to him—something he can neither prevent nor repeat. But gradually all of his vague feelings become more distinct by being repeated, and as the connective fibers grow in his brain, the various feelings become associated with one another. The wonderful change in a baby usually occurs when he is about six months old, and is due to his discovery that he can move this way or that as he pleases, and can direct his movements with his eyes. Immediately he begins doing what he sees other people do. He begins to imitate sounds, facial expressions, and movements of all sorts.

The age at which children begin walking varies so greatly that it is impossible to give any date for it. But since a baby learns by imitation, he is likely to begin walking at an earlier age if there are other children in the family. Some babies learn to walk before they are a year old; others do not walk until nearly the second year. Of course, the baby kicks and practices creeping before he begins to walk; otherwise he would not have sufficient muscular strength to master the art. Walking has a marked effect on most babies. They get a new view of things when they can see the world from a standing position, and as a rule they actually sleep better, eat more, and become better-natured and happier.

In order that growth in muscular control may develop properly, children should be encouraged to be active, to use all the large muscles of their bodies. All children should be free to run around, to romp, and to play as much as they wish. When they are a little older, they will be greatly assisted in learning control of the smaller muscles by having plenty of tools to work with, and they should be encouraged to make their own toys, play-houses, doll clothes, and other things.

Language. Tears, smiles, cries, and gestures are the baby's first means of expressing his emotions. A baby cries from the first; he will shed tears any time after the twenty-third day, and he sometimes smiles in the second week. By the fourth month, he will stretch out his hands toward the thing he wants, and still later he will put his hands together as if he wanted to grasp an object. Between the eighth and the twelfth month, he begins pointing at the thing he wants. He will begin in the sixth month to express affection through imitating the kisses, pats, and hugs of other people, and begin using a real gesture language. He will tug at his mother's dress if he is hungry, will stretch out his arms to be taken up, and learn to wave "bye-bye." A little later, all

sorts of coaxing and begging gestures will appear.

Even after he begins to speak, he will supplement his words with gestures, just as many savages do. A baby's greatest difficulty at first is learning to articulate. Once this ability has been acquired, his progress in learning to talk will be very rapid. Another obstacle is learning to walk. While he is doing this, a baby acquires no more speech and may even go backward, but afterward, the learning and understanding of words is very rapid. His progress at this stage will be greatly influenced by the people around him. It is only by observing the language used by a baby and noting his mistakes that an adult begins to realize what an immensely complicated thing is speech. Surely the fact that most children by the fifth year have obtained a good working knowledge of the mother tongue would alone justify the claim that these are the years of most importance, the years of greatest development.

The Pre-School Child. See, in these volumes, **NURSERY SCHOOL.**

The Kindergarten Child. Froebel, the man who conceived the idea of the kindergarten, and Maria Montessori, one of the distinguished child educators of to-day, both set out with the idea of helping the child under six to develop to the height of his powers. The necessity for the normal development of the senses has already been shown. This development is bound to go on, whether it is encouraged or not, but if it is systematically fostered and stimulated, the child will be better equipped than if he has to acquire everything in a haphazard fashion. Such a system of child-training as is furnished by the kindergarten and the Montessori school goes still further. It not only helps a child to develop the senses, but it also trains him to associate his sensations with the spoken symbols, so that everything he learns is made more usable. It also helps him to acquire muscular control, teaches him to use the large muscles of his body, arms, and legs, and the smaller muscles of the hands and fingers. And hand in hand with this training goes the development of all the mental powers, imagination and reason, memory and perception (see **PSYCHOLOGY**).

The School Child. Let us suppose that the child up to the age of six has lived in an environment which has developed brain and body to its fullest capacity. Bubbling over with energy, alert, imaginative, eager, and curious, expressing himself spontaneously and exuberantly on every occasion, the six-year-old comes to the public school. Here every sense he has begun developing, every interest he has displayed, should be made use of; his curiosity must be stimulated and satisfied; his energy directed. He should go on acquiring

more discrimination as to colors, more delicacy of touch, more sensitiveness of hearing, greater muscular control, and a larger appreciation of everything beautiful. And he must also go on learning to express himself more clearly and accurately, both in spoken and in written language.

In this development, the school, the home, and the playground are almost equally important. It is the duty of every parent and every teacher to see that all three are forces for progress and not for retrogression. Under the headings EDUCATION, CHILD STUDY, and other related topics referred to at the close of this article, this phase of a normal child's education is treated in greater detail in these volumes. Space will be given here only to a brief treatment of some of the conditions which must be guarded against.

Physically Defective Children. It is rapidly becoming the practice to have physical inspection in all public schools. This is of prime importance, because it has been found in many cases that children who are considered obsti-

nate, stupid, or positively bad are partly blind or deaf, or are the victims of serious nervous trouble. The eyes and the ears are the principal channels through which knowledge comes; so the child who cannot hear and see perfectly is seriously handicapped. He may not know of his trouble, unless there is actual pain, and for this reason his parents and teachers should be alert for signs. Defective eyesight can be discovered by noting a child's position when he is reading or writing. If his eyes are either more or less than a foot from the book he is reading, he should be given special tests with a set of cards, which can be bought for ten cents, to determine what is the trouble. Nearsight, farsight, and astigmatism are the most common ailments (see EYE; BLINDNESS; ASTIGMATISM).

By first determining, by means of a watch, how far a normal child can hear, the standard for testing the child suspected of deafness may be fixed (see EAR). If a child is dull or does not pay attention, or if he asks constantly to have things repeated, he should at once be tested for ear trouble. And it should be remembered that the purpose of testing children in these ways is always to discover whether a doctor's care is needed.

Many communities now provide special classes or schools for physically handicapped children, such as those suffering from defects of hearing, sight, and speech.

Fatigue. Complete fatigue, or nervous exhaustion, is almost as difficult to recover from as a severe illness. For this reason, children must be watched carefully and guarded against overwork, too long hours of work, too great worry over their tasks, not enough work, or work that has not sufficient variety; for all these conditions bring about a state of fatigue which is likely to result in serious harm. The great trouble with many



Photo. St. Clair

A PHASE OF CHILD LIFE

In many rural sections, the "Old Oaken Bucket" is an irresistible attraction to children

public schools is that the classes are large and the teacher has not the time to give every child sufficient individual attention. This, then, must be the duty of parents. It is essential that they be on the lookout for signs of nervous or bodily fatigue.

In order to avoid excessive fatigue, a child must be interested in his work, and he must find a great deal of variety in it. His hours of work must not be too long; he must not do much outside work; he must get plenty of play, plenty of sleep, and plenty of good, nourishing food. It is the duty of parents, wherever possible, to cooperate with the teacher in securing the best working conditions within their power for the child—light, well-ventilated school rooms, a comfortable desk and seat, adequate teaching equipment, and

well-kept, spacious playgrounds. The comfortable seat and desk are of vital importance, because the body of a growing child is very plastic, and a wrong sitting position held for several hours out of every day will change and deform the body.

Signs of Fatigue. The signs of fatigue are inattention, restlessness, and irritability. Tests have shown that a person who is very tired is also not as sensitive to touch, that his eyes cannot distinguish colors as well as when he is rested, and that his muscular control is impaired, for he will be more clumsy and awkward in moving about. He is more likely, too, to be impertinent and undisciplined than when he is rested. A good night's sleep and plenty of wholesome food ought always to restore a child's good temper and energy. If it does not, then the conditions under which he works and plays must be changed.

The Exceptional Child. There is a large class of children who are constituted differently from the average child, and for whom inadequate provision is made in the public schools. There is the exceptionally bright child; there is the eccentric child, who has marked individuality without being either inventive or original; there are the feeble-minded child, the backward child, and the wayward child. Of course all children vary a little from the average. There is actually no such individual person as the *average* child; it is simply a term given to a composite of all the statistics on children. Up to a certain point, this variation from the average has no significance, but beyond it we have the abnormal or exceptional child who is so great a problem in the schools. Institutions are now solving the problem of feeble-minded children and those difficult to manage, and in smaller classes and by special instruction, the problem of the exceptional and the backward child. All these exceptional children need an unusual amount of care. C.E.S.

Related Subjects. The following articles in these volumes, relating to children or to children's activities, will be of interest in connection with this topic:

Anger in Children	Eugenics
Baby	Fear in Childhood
Boys' and Girls' Clubs	Games and Plays
Boy Scouts	George Junior Republic
Camp-Fire Girls	Habits in Childhood,
Canning Clubs	Troublesome
Child Labor	Heredity
Children, Societies for	Industrial Art
Children's Bureau	Kindergarten
Child Study	Montessori Method
Cruelty to Animals, Society for Prevention of	Nursery School
Doll	Play
Dress	Schools
Education	Story-Telling
	Toys

CHILDERMAS. See INNOCENTS, FEAST OF HOLY.

CHILD-GUIDANCE CLINICS. See MENTAL MEASUREMENT (In Child-Guidance Clinics).

CHILDHOOD, BEHAVIOR IN, as affected by gland development. Behavioristic doctrine, making a clean sweep of all previously acquired conceptions, has devoted a good deal of its interest and attention to the fresh study of movements, secretions, and their association by conditioning. They have undoubtedly contributed greatly to a better understanding of behavior. Regarded from the endocrine standpoint, the behavior of the child is modified as the hormones, the internal secretions of the endocrine glands, modify (1) the amount of energy functioning in the nervous system, (2) the irritability of the nervous system, (3) the fatigability of the nervous and muscular systems, and (4) the recuperability of the nervous system.

All these effects are important in the excitations and inhibitions involved in the learning process, which becomes responsible for so much of the child's emotional, intellectual, and volitional behavior. We have to consider, as affecting all of these, the various ductless glands, the pituitaries, pre-pituitary, and post-pituitary, the pineal, the thyroid, and parathyroids, the thymus, the adrenals (medullary and interrenal), and the gonads, or sex glands.

To begin with the best studied of these, the thyroid: The well-known picture of the cretin, the idiotic dwarf, illustrates the results of complete or considerable degrees of thyroid deficiency, presenting themselves as dullness, laziness, fatigability, associated ill-health, and poor growth—these types are called *cretinoids*. In the regions of the world known as goiter belts—in the United States, for example, around the Great Lakes—they are fairly common. These behavioral characteristics may be associated with behavioral apathy and lethargy associated with nervousness—a tendency to bite the nails and to flush easily, for instance. On the other hand, thyroid hyperactivity, the hyper-thyroid, presents the contrasting phenomena: liveliness, activity, restlessness, fidgetiness, ease in learning and doing, with emotional instability and a tendency toward ups and downs in the moods.

The pituitary glands, the pre-pituitary in particular, influence mental as well as physical growth. Children with hyperactive pre-pituitary are generally calm, cool, and collected, have good judgment in learning, and retain what they learn. They have what is called ability to concentrate, to focus attention or energy upon a situation. They are protected, in other words, against distraction. On the other hand, children with a sub-average pre-pituitary have difficulty in concentrating, are easily distractible, mentally fatigable, and have poor memories; they retain learned material poorly.

The post-pituitary has relation to what may be called the dominant mood attitude in be-

havior. Children with a hyperactive post-pituitary tend to be thin, rather moody, and what is called temperamental. At the same time, they are cold in their relation to human beings, egotistical, and self-centered. On the other hand, those with post-pituitary deficiency tend to be fat and affectionate, and even sentimental. The post-pituitary functions with the emotional centers in the floor of the third ventricle and the sub-thalamus in the brain. A certain balance between pre-pituitary and post-pituitary seems to determine the degree of development of the sense of humor, which must be distinguished from the sense of fun.

As regards the pineal gland, sexual precocity in behavior may depend upon its proper functioning.

The parathyroid glands, controlling as they do the history and metabolism of lime in the body, have a profound influence upon behavior. When they under-function, there is produced an overexcitability which may be associated with a repressed nervousness that may break out in tantrums and hysteria. The tendency of the child to indulge mild hallucinations occurs in the most marked form in those children in whom it may be either a curse or a blessing. Emotional misbehavior in the school-room has been changed by the treatment of parathyroid deficiency.

The thymus gland in the chest is important in behavior, because it undergoes a certain amount of evolution and involution parallel with the development of the whole personality. If its involution or evolution is interfered with, there may result an interference with the evolution of the other glands, particularly the pituitary and the sex glands, with a consequent retardation in the normal evolution of the whole personality. The individual is tainted with a certain infantilism or juvenility in his behavior, reminding one of the habits of those much younger than himself, and characterized by an inability to lift himself to the right age of adaptation.

The adrenals play a definite part in the behavior of children, according to clinical experience. Children whose adrenals have been damaged tend to be timid, inactive, and fatigable. On the other hand, those with hyper-active adrenals tend to be positive, aggressive, pugnacious, active, and able to resist fatigue.

In general practice among children, we often see the child whose adrenals have been damaged by one of the common infectious diseases, such as diphtheria or influenza. They are characteristically apathetic. Socially, however, they are described as "sissies," when they are males, and they may tend toward introversion because of a developing social-inferiority complex.

As regards the sex glands, children show individual variations in behavior, both masculine and feminine, depending upon the degree of development of the internal secretions of the gonads, or reproductive organs. In relation with the thymus, there may be curious distortions and mal-development of this function of the sex glands, which may lead to all degrees of variability in sexual attitude and behavior.

L.B.

Related Subjects. The reader is referred in these volumes to a number of articles closely related to childhood:

Anger in Childhood	Heredity (Inheritance of
Character Training	Intellectual and Moral
Dishonesty in Childhood	Traits)
Fatigue and Nervousness	Mental Conflict, a
Habits in Childhood	Cause of Misconduct

CHILD LABOR, a term relating to the employment of children in industry. Children have been thus employed from the earliest days of recorded history, but the problem of child labor, as it is commonly understood, has developed with the modern factory system. In every country in which manufacturing industries have reached a high state of development, competition is keen, and effort is constantly being made to keep the cost of production low. In such countries, child labor is a vital social and economic issue.

The Development of the System. Under the conditions of labor which preceded the factory system, the employment of children was regarded as a part of their education. Either as apprentices or in the workshops of their parents, they learned a trade and "habits of steady industry." While there were many cases of abuse under this system, there was a close personal relation between the master and the child, which usually checked the master's indifference to the child's good. The factory system is characterized by two features which did not exist under any preceding system of labor: first, the employment of workmen in large numbers has tended to destroy personal relations between master and workman; second, the operation of automatic machinery frequently requires quickness and deftness rather than physical strength. In England, where child labor first became a social menace, the demand for children to work in textile mills was supplied by a vicious system, using pauper children collected from the poorhouses. These children received as pay only their food and lodging. As competition became more intense, the working and living conditions of the children became worse, until they constituted a form of slavery. Children five years of age were sometimes found in the mills. Hours of work were unregulated, and a day of twelve hours, or "from sunrise to sunset," was not uncommon.

Such conditions existed in England during the first quarter of the nineteenth century. In

the United States, child labor did not involve great numbers of children until the period of industrial expansion which followed the War of Secession. In Belgium, Germany, and Italy, it began to trouble economists and sociologists about 1875 to 1880, and in Canada the problem is even more recent.

The Regulation of Child Labor. All students of social welfare recognize the fact that child labor is an evil whose influence extends to succeeding generations, and that it must be controlled by legislation.

The first law regulating child labor, in the modern sense, was passed by the British Parliament in 1802. It applied to cotton mills only, forbade work between 9 P.M. and 6 A.M., limited the working day to twelve hours, and required elementary school instruction for apprentices. An important act of 1819 prohibited the employment of children under nine years of age in establishments for the preparation and spinning of cotton. These early statutes were weakened, however, by failure to provide for their enforcement. Step by step, greater protection was given to the child, until now the minimum age for full-time work is fourteen.

Following the lead of England, Germany passed its first law regulating child labor in 1839, and nearly all European countries now give the child some degree of protection.

In the United States, where the problem is newer, there is naturally a variety in the details of state child-labor laws. These laws all fix a minimum age below which children must not be employed, ranging from twelve in special cases in a few states to sixteen in others. The average age limit is fourteen. Many states fix a sixteen- or eighteen-year limit upon employment in specified dangerous or hazardous occupations. Many of them regulate the length of the working day and prohibit night work. Most states require children to procure certificates showing their age and extent of schooling, and in these states employers who hire children without such certificates are liable to a penalty. An educational minimum and a certificate of physical fitness are required in a few states, in addition to a documentary proof of the child's age.

The enactment by Congress of a national child-labor law has been agitated by various organizations and individuals for many years, and such a law was passed in 1916, prohibiting the interstate shipment of goods produced in factories which employed children in violation of certain age and hour restrictions. The bill, known as the Keating-Owen Act, was signed by President Wilson in September. However, it was declared unconstitutional in 1918.

In the following year, another law designed to protect children was enacted by Congress. It placed a ten per cent tax upon the income of manufacturing establishments of the type

mentioned above. This statute was declared unconstitutional by the United States Supreme Court in May, 1922. It was held that the law encroached upon the rights of the various states to conduct their internal affairs in their own way. A constitutional amendment to authorize Federal legislation was then proposed, which as the Twentieth Amendment was approved by Congress in 1924; it was submitted to the state legislatures for ratification, but was not ratified by the required three-fourths of the states of the Union.

L.L.B.

CHILDREN, MENTALLY DEFICIENT. See **MENTAL HANDICAPS**, subhead.

CHILDREN, SOCIETIES FOR. In all civilized countries there are organizations having for their purpose the protection and care of children who have become orphans, or who, for other reasons, have been deprived of suitable homes. In America the most widely known of these are the Society for the Prevention of Cruelty to Children, Saint Vincent's Aid Society, the Jewish Relief Association, the Children's Aid Society, and the American Humane Association. The purpose of these societies is to protect children from evil associates and from cruelty on the part of those who employ them or have the care of them. Home-finding societies, whose purpose it is to place orphans in suitable homes, are formed in many provinces, states, and large cities. Juvenile courts (which see) have jurisdiction over all cases of dependent and delinquent children, and those conducted according to the most advanced methods exercise the right of jurisdiction in regard to placing children outside the home. The administration of these courts is for purposes of guardianship, education, and protection, not for trial and punishment. The Children's Bureau (which see), in the Department of Labor, was organized by the United States government to conduct investigations and publish reports relating to the welfare of children.

CHILDREN'S BUREAU, a bureau of the United States Department of Labor, created by act of Congress April 9, 1912, and directed to investigate and report upon "all matters pertaining to the welfare of children and of child life" among all classes of people. It was the first public agency in the world the function of which was to consider as a whole the problems of childhood. The first director of the Bureau was Miss Julia Lathrop (born 1858), who was succeeded in 1921 by Miss Grace Abbott (born 1878), the present chief.

The Children's Bureau has seven major divisions, as follows: maternity and infant hygiene, child hygiene, industrial, social service, statistical, editorial, and general administrative. The maternity and infant-hygiene division conducts research into the causes of infant and maternal deaths, and is charged with the

administration of the Federal maternity and infancy act, under which the welfare and hygiene of mothers, babies, and pre-school children are promoted, in cooperation with the state agencies of forty-five states and the territory of Hawaii. The child-hygiene division is in charge of the Bureau's studies in the field of child health, and assists the other divisions in the preparation of reports in which child health is a factor. The social-service division has for its field dependency, delinquency, and neglect of children, and the industrial division is responsible for studies relating to the employment of children, protective legislation for working children, and vocational guidance. The statistical, editorial, and general administrative divisions serve the other divisions of the Bureau.

An important part of the Bureau's work is the answering of letters from parents asking questions about the care of children, and the distribution of literature, ranging from brief folders and popular bulletins on prenatal care, infant care, child care, and child management, to technical reports for professional child-welfare workers.

K.F.L.

CHILDREN'S CRUSADE. See CRUSADES, subhead.

CHILDRRESS, SARAH. See POLK, JAMES KNOX.

CHILDS, GEORGE WILLIAM (1820-1804), one of the most notable of American publishers and philanthropists. He was born in Baltimore, but began his business career in Philadelphia, becoming a partner in the publishing house of Childs & Peterson in 1840. In 1864 he purchased the Philadelphia *Public Ledger*, one of the earliest of the low-priced daily papers. Under his management, it became very influential and made its owner a wealthy man. Mr. Childs' charities, both public and private, were numerous. Among the most noted of his public gifts were a memorial fountain at Stratford-on-Avon in England, a monument over the grave of Edgar Allan Poe, the presentation of a printers' cemetery - "Woodlawn"---in Philadelphia, and a subscription which made possible the endowment of the home for union printers at Colorado Springs. His private benefactions were equally large, and included among many others the educating of 800 boys and girls and the pensioning of many old literary workers.



CHILE, che' lay, a progressive republic in South America, extending ribbonlike along the Pacific coast for 2,700 miles. Its average width is but eighty-seven miles. If placed on the map of North America, this country (about thirty times as long as it is wide, and therefore sometimes called the *shoestring republic*) would stretch from Hudson Bay to about 200 miles south of Cuba. Another indication of its shoestring shape is the fact that the country is as long as from New York City to San Francisco, and as narrow as Lake Erie. Its total area is only 289,810 square miles. On the north, it touches Peru; on the northeast, Bolivia; along its eastern boundary stretches Argentina, and the Pacific Ocean washes the western shore; a large part of Tierra del Fuego (the Land of Fire) and the famous island of Cape Horn constitute the southern extremity of Chile; it is thus projected a thousand miles farther south than the southern point of Africa.

The name *Chile* is Indian, but its origin is disputed. It was probably derived from an Indian word meaning *cold*, referring to the perpetual snow on many of the mountains.

The People. About four million people live in this peaceful republic, the great majority of whom are of European descent. About one-fourth of them are of pure Spanish stock, very largely from the more energetic and progressive element of Northern Spain, where the climate most closely resembles that of Central Chile.

The language of the country is Spanish. Very many of the influential families have been settled in Chile for more than a century, and the social customs reflecting the high culture of old Spain are everywhere in evidence. Roman Catholicism prevails.

The foreign population consists chiefly of Spanish, French, Germans, Italians, and British, who have been drawn thither generally for purposes of business. There are also 50,000 Peruvians and Bolivians in the north.

Of the ancient inhabitants of Chile, the Araucanian and Patagonian Indians, dwelling on the slopes of the Andes, only about 100,000 of the former remain, and the latter are practically extinct. Noted for their intense love of liberty and their determined, warlike spirit, they were the last native tribe in all

America to give up their independence; not until 1881 did they actually recognize the authority of the Chilean government (see PATAGONIA). In the southernmost part of Chile is the remnant of another primitive race, the Yaghans, still uncivilized.

The Cities. Santiago, the capital, and Valparaiso, the most important seaport, are described in these volumes under their individual titles. In addition to Coquimbo, a small seaport situated in the iron-ore district, the remaining cities of importance are the following:

Concepcion, *kon sep' se ohn*, a river port situated 300 miles south of Valparaiso, in a fertile agricultural district. The city was founded in 1550, and in early Spanish days was the second largest city of Chile, but it has twice been destroyed by earthquake. The present city is modern, clean, and progressive, with a population of about 65,000. The independence of Chile was declared here in 1818.

Iquique, *ik' kay*, a seaport for the northern arid district, where the great nitrate fields abound. It is important as an outlet to the sea for Bolivia. The city has suffered as the scene of earthquakes and of conflicts over boundary disputes. Its population is about 37,000.

Magallanes, prior to 1928 called PUNTA ARENAS, the southernmost incorporated town in the world, almost pathetic in its loneliness and in its distance from other cities. It is situated on the Strait of Magellan, at the south end of the continent of South America, and is the capital of the Chilean territory of Magallanes.

The city has been important chiefly as a coaling station for steamships, though its seal fisheries have considerable value. It has many foreigners engaged in sheep-raising, farming, and lumbering, and it exports meat and wool. The city was founded in 1840, on the site of a former penal colony. It has about 23,000 inhabitants; the territory of Magallanes has 30,000 people.

The Land Surface and Climate. The mighty mountains of the Andes extend the length of the country, and among the lofty snow-crowned peaks of the range are numerous volcanoes; earthquakes are very frequent in this region of the world.

This long strip of country falls into three distinct zones. In the north is the arid desert of Atacama, a sub-tropical region rich in minerals. In the center is a rich valley 600 miles long, watered by numerous small rivers rising in the Andes. This agricultural section of Chile, where the rain supply is fairly abundant, enjoys the delightful climate of perpetual spring; it is the granary of the country, the heart of the nation, and the home of most of its people.

Finally, in the southern portion is found a mountainous, heavily forested section, a cold region with almost continuous rains. Here, where the famous Strait of Magellan cuts through Chilean lands, the otherwise uniform coast line breaks into picturesque ruggedness. The fiords and islands and forest-covered

mountains topped with glaciers remind one of the romantic scenery of Northern Europe.

The rivers are of little importance for transportation, being short and turbulent, but several in the south, the Imperial, Bio-bio, Valdivia, and Bueno, are navigated by small steamboats for some distance. Unlike many South American countries, Chile has few birds, beasts, fish, or reptiles.

Mineral Resources.

The vast mineral wealth of Chile was the cause of early boundary disputes. In the northern desert of the country, a region inhospitable in itself, lie the world's greatest nitrate beds, supplying one of the

finest fertilizers known. This whitish-looking mud, so easily obtained by a surface-scraping process, is Chile's chief export and source of revenue. Almost all of it is sent to Europe and the United States, Iquique being celebrated as the world's greatest nitrate port. This source of easy wealth, however, scientific men have estimated will be exhausted by the year 1940. Iodine, a by-product of nitrate of soda, is also a considerable article of export, especially to the United States.

Copper ores are next to nitrates in importance among the mineral resources. Chile is the world's second largest producer of copper. Immense iron-ore deposits are also found in the northern provinces, together with gold, silver, cobalt, nickel, and manganese. Valuable coal mines are situated south of Valparaiso.

Agriculture. Most of Chile's agricultural activities are confined to its great central valley, where there are large estates owned by wealthy Chileans and by the Roman Catholic Church. These estates are worked with modern machinery. The poorer classes serve as laborers, for they cannot own farms, because of the high price of land. Sixty per cent of the agricultural land is owned by fewer than 600 proprietors. The most important cereal crops are wheat, barley, oats, maize, and beans. Mediterranean fruits, figs, olives, apricots, and grapes grow abundantly. Chile is noted for its production of excellent wines. Apple-growing has become very successful, especially in the southern portion.

The shaggy slopes of the more southerly areas, and even the region of Tierra del Fuego, provide pasture for millions of cattle and sheep;



LOCATION MAP

Showing the position Chile occupies in the continent, and its size as compared with other South American republics

dairy farming and the production of butter and cheese are on the increase. The extensive forests of these regions are important for lum-



A STARTLING COMPARISON

Northern Chile is as far south of the equator as Haiti is north of "the line", its southern extremity is in a latitude comparable with Southern Hudson Bay. The above map shows where Chile would lie could it be turned upon North America, with the equator as an axis.

bering industries. Immigration is small, and it is only by special inducements offered by the government that a number of Japanese farmers have settled in the country.

Manufactures and Commerce. Manufacturing industries are unimportant. Soap, furniture, and shoes are the chief products, except in a southern German settlement at Valdivia, where large breweries, distilleries, saw mills, and tanneries are found. Textiles, machinery, paper materials, animal products, and chemicals have for years been imported from Great Britain, Germany, and the United States, and sugar and petroleum from Peru. Most of Chile's agricultural products are consumed locally; the chief exports are nitrates, wool, hides, and leather. Chilean wines and beans find a market among the country's South American neighbors.

Transportation and Communication. Chile was the first South American state to construct a railway, the oldest line having been opened in 1852. By 1888 construction was begun on a large scale, and there are now more than 5,600 miles of railway open for traffic, over 3,100

miles of which belong to the state. One of the most famous in operation is the Trans-Andean Railway, connecting Valparaíso and Buenos Aires, Argentina, a distance of nearly 800 miles. Chile has over 22,000 miles of public road, and about 850 miles of navigable rivers.

Although harbors on the Chilean coast are not of the best, shipping from its ports exceeds that of any other South American country on the west coast. An excellent breakwater at the Valparaíso harbor has greatly improved that port and made anchorage safe. The chief ports are Valparaíso, Iquique, Talcahuano, and Antofagasta. The completion of the Panama Canal, greatly shortening the water route to Chile from New York and Europe, is vastly increasing the republic's commerce, especially notable in the mining industry. The ocean route from Valparaíso to New York has been shortened from 8,337 miles to 4,627 miles, and that from Valparaíso to Liverpool from 8,747 miles to 7,185 miles.

Education. Until recently, public instruction was much neglected, and the illiteracy rate was very high; but rapid strides have been made, and through the efforts of teachers brought from Germany and the United States, modern methods and systems have been installed. Public schools are provided by the government, and education has been compulsory since 1920. Besides normal, secondary, and commercial schools, all public, there are agricultural and professional schools, schools of mines, music, arts, and trades, an institute for deaf-mutes, a



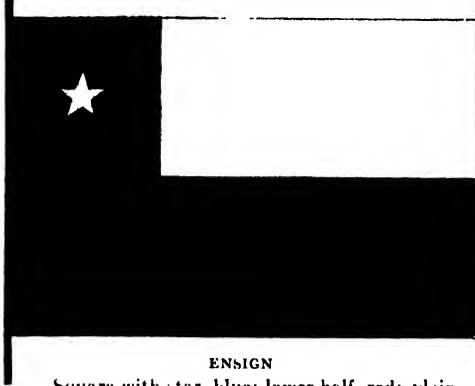
A YAGHAN HUT

school for the blind, public museums, and the National Library. There are two universities, one supported by the state, the other by the Roman Catholic Church.

Government and Religion. By amendments in 1925, the executive power is vested in a President, who is elected for a term of six years by direct popular vote; he is ineligible for immediate reelection. A Cabinet of Ministers aids the President. Voters must be twenty-one years old, and be able to read and write.

Legislative power is vested in a National Congress, elected by direct popular vote, and

consisting of a Senate with forty-five members, elected for a term of eight years, and a Chamber of Deputies, consisting of one member for every 30,000 inhabitants. For local government, Chile is divided into provinces, which are



ENSIGN

Square with star, blue; lower half, red; plain surface, white

divided in turn into departments. Police of the capitals of departments and of Santiago, the capital of the republic, are organized by the President at the expense of the Treasury.

Besides a High Court of Justice in the capital, there are courts of appeal throughout the republic, Tribunals of First Instance in department capitals, and smaller courts in districts. There are two central prisons, more than twenty penitentiaries, besides houses of correction, reformatories, and public hospitals, lunatic asylums, shelters, and dispensaries.

Affairs of state are still largely controlled by great landholders, the poorer classes being largely illiterate, and therefore disqualified to vote. The Roman Catholic Church, sustained at public expense until 1925, is still powerful because of its numbers, but Roman Catholicism is no longer the state religion. All churches are tolerated.

History. The real conquest of Chile began under the direction of Valdivia, in 1540. For more than two centuries, the brave and intelligent Araucanians struggled against the Spanish power. By 1810 Chile, tired of Spanish domination, revolted, and gained independence eight years later.

The Chileans being a peace-loving and patriotic people, the country has been fairly free from internal revolutions such as have marked the history of most Spanish-American countries. Disagreements with outside countries have provoked most of Chile's troubles.

The valuable deposits of nitrate in Northern Chile have caused many boundary disputes. Beginning in 1843, the question of the Argentina boundary menaced peaceful relations, until in 1881 a treaty was signed. But even after that, rumors of war caused a disturbed condition in both countries until 1902. A remarkable

statue of Christ was erected in the heart of the Andes, on the boundary between the two countries, to celebrate ultimate peace. (There is an illustration of this monument under the title ARGENTINA.)

In 1865 Chile and Peru were forced into a war with Spain, the most significant event being the bombardment of Valparaíso by a Spanish fleet, in 1866. Through the intervention of the United States, hostilities were ended in 1869, and ten years later peace was established. Then war commenced with Bolivia and Peru over nitrate deposits. In the war, Chile added to its possessions the province of Atacama from Bolivia and Tarapacá from Peru, and also secured control of two small Peruvian provinces, Tacna and Arica. It was agreed that after ten years a vote of the people of these two provinces should determine their future sovereignty, but Chile placed such restrictions on this proposed vote that Peru steadfastly refused to concur in the plan. Finally, in 1923, the matter was put up to the United States for arbitration, with the President as umpire. General Pershing was appointed as head of an arbitration committee in 1925, but months of bickering brought no results; the question was settled in 1929.

From the adoption of constitutional government, in 1833, to 1871, Chile had but four Presidents, each serving for two terms. In 1873 the Constitution was liberalized by amendments. In 1891 President Balmaceda advocated a still more democratic government, and a civil war broke out, which resulted in defeat and suicide for the President. The belief that the United States favored the cause of Balmaceda led to a serious conflict at Valparaíso between some United States sailors and a crowd of Chileans; the immediate dispatch of warships from the American republic brought apology, and since then a spirit of friendship between the two republics has steadily grown, with increasing intimacy of relations between them. Chile is one of the "A B C" powers (Argentina, Brazil, and Chile) which offered to mediate in 1914 between Mexico and the United States.

Chile remained neutral during the World War, but furnished the Allies with war materials. Manufacturing has increased, and labor and social problems have been mitigated by law. In 1924 a group of army officers overthrew the government, substituting a military régime, which instituted necessary reforms. But the public soon began to demand a return to constitutional government. A greatly liberalized Constitution was adopted in October, 1925; the President was recalled, and peace was restored. Late in 1928 Herbert Hoover, President-elect of the United States, paid a visit of friendship to the Chilean people.

OUTLINE AND QUESTIONS ON CHILE

Outline

I. Location

- (1) Latitude, $17^{\circ} 57'$ to $55^{\circ} 58' 40''$ south
- (2) Longitude, about that of Boston
- (3) Boundaries
- (4) Distance from New York and London

II. Size and Form

- (1) Length, 2,700 miles
- (2) Average breadth, 87 miles
- (3) Area
 - (a) Comparative
 - (b) Actual
- (4) "Shoestring republic"

III. Physical Features

- (1) Surface regions
 - (a) Northern desert section
 - (b) Central valley
 - (c) Southern mountainous section
- (2) The Andes
- (3) Rivers

IV. Climate

- (1) Sub-tropical in north
- (2) Pleasant and healthful in central section
- (3) The cold southern region
- (4) Rainfall

V. The People

- (1) Population
 - (a) Actual
 - (b) Comparative
 - (c) Density
- (2) Natives
 - (a) Origin
 - (b) Characteristics

(3) Foreigners

- (4) Ancient races
 - (a) Araucanians
 - (b) Patagonians
- (5) Religion
- (6) Education
 - (a) Absence of compulsory education laws

VI. Industries and Transportation

- (1) Mining
 - (a) Nitrate of soda
 - (b) Copper
 - (c) Other minerals
- (2) Agriculture
 - (a) Location in central valley
 - (b) Stock-raising
- (3) Manufacturing
- (4) Communication
 - (a) Railroads
 - (b) Rivers
 - (c) Roads
 - (d) Coastwise trade
 - (e) Connection with other countries
 - 1 Influence of Panama Canal

VII. Government

- (1) Republican form
- (2) Departments
- (3) Local government

VIII. History

- (1) The conquest
- (2) Independence achieved
- (3) How its history has touched that of other countries in North and South America
- (4) Recent progress

Questions

What might be called the "ice-houses of the Strait of Magellan"?

What metal was once mined in Chile in greater quantities than in any other country in the world?

How does the country now rank in the production of that same metal?

Why is it safer for vessels to anchor in the harbor of Valparaiso now than it was a few years ago?

What class of the population has most to do with governmental affairs?

Who were the Patagonians? Give some of their characteristics. How many of them remain?

What is the great mineral product of the desert region? What is it used for?

What distinction has this country among South American states in the matter of railway transportation?

By whom are the policemen paid in Santiago?

OUTLINE AND QUESTIONS ON CHILE—Continued

Questions—Continued

How large a proportion of the inhabitants of the country are European-born?
How many are from the South American countries to the north?

How long do experts estimate that Chile's chief source of mineral wealth will last?

Under what conditions do the few surviving primitive inhabitants of the country live?

How many prisons are there in Chile?

What language does a Chilean speak?

How does the country differ in its flora and fauna from most other states of the continent?

What connection has one of Chile's outlying possessions with a famous English classic?

What attitude does the government take toward immigration?

When did the United States intervene and bring about peace for Chile?

How does this country differ in national character from those countries colonized by Spaniards from the south of Spain?

What part of the Andes has the largest eternal snowfield?

If South America were folded over upon North America, according to latitude, how far would Chile reach?

What resource of great value has been the cause of numerous disputes between this country and its neighbors?

How did Chile and Argentina celebrate the establishment of a lasting peace between them?

What was the probable origin of the country's name?

What resemblance is there between the far southern coast of this country and a certain far northern shore line?

Why is this known as the "shoestring republic"?

What state of the American Union is nearest it in area?

Are there any particulars in which Central Chile may be compared with Central California? How do the two compare in latitude?

How large a proportion of the population makes its living by agriculture?

Related Subjects. The following articles in these volumes will make more clear certain phases of this general subject

Andes	Patagonia
Argentina	San Martín, José de
Copper	Santiago
Horn, Cape	Sheep
Magellan (Strait of)	Tierra del Fuego
Nitrates	Valparaíso

CHILE CON CARNE, *che' lay kon kahr' nay*, a Spanish dish, now popular in the United States with those who enjoy "hotly" seasoned food. *Chili*, or *Chilli*, is the Spanish name for red peppers, and *chile con carne* means peppers with meat. The following is a recipe for enough to serve six or eight people:

Clean, singe, and cut in pieces for serving, two young chickens. Season with salt and pepper, and fry quickly in butter. Remove seeds and veins from eight red peppers, cover with boiling water, and cook until soft. Mash and rub through a sieve. Add one

teaspoonful salt, one finely chopped onion, cloves garlic finely chopped, and the chicken, and cover with boiling water. Cook until chicken is tender. Remove and thicken sauce with three tablespoonfuls each butter and flour cooked together. Canned pigment may be used in place of red peppers. E V M

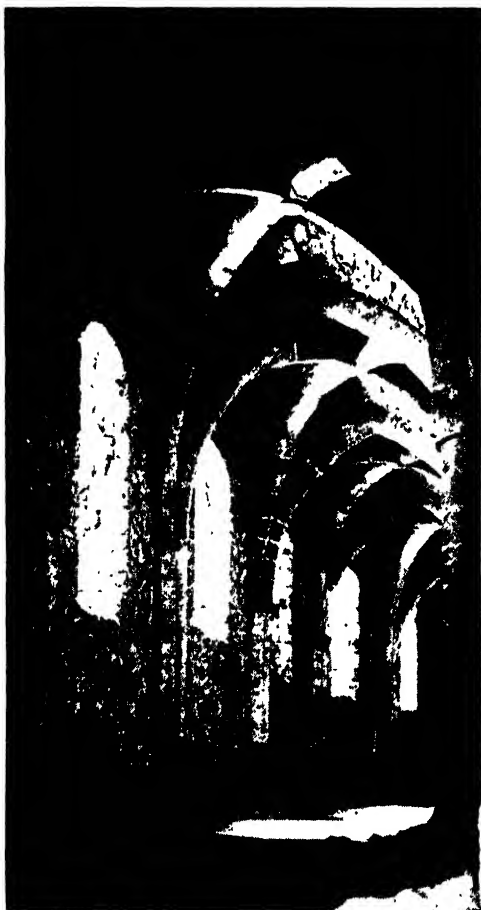
CHILE SALT PETER. See SODIUM.

CHILLICOTHE, *chil i koth' e*, OHIO. S
OHIO (back of map).

CHILLON, *shil lon'* or *she yoN'*, a cast fortress on a rock at the east end of La Geneva, Switzerland, reached from the mainland by bridge. It has acquired interest from Byron's poem, *The Prisoner of Chillon*, which tells the story of Francis Boniville, prior of Saint Victor and Genevan patriot, who was cast into an underground dungeon of the castle by the counts of Savoy. From 1530 to 1536 he suffered there in the cause of religion. The tale is not entirely true. See page 13.



THE CASTLE OF CHILLON, MADE FAMOUS BY LORD BYRON



CHILLON CASTLE DUNGEON

Photo OROG

CHILLS AND FEVER. See MALARIA.

CHILON, *che lahn'*. See SEVEN WISE MEN OF GREECE.

CHIMAERA, *ki me' rah*, in the stories of Homer, a fire-breathing female monster with the head of a lion, the body of a goat, and the tail of a serpent, that long laid waste the land of Lycia and Caria. The hero, Bellerophon, commissioned by the Lycian king, Iobates, to destroy this creature, procured with the help of Minerva the winged steed Pegasus. Speeding through the air, he found the Chimaera and killed her. See BELLEROPHON.

Modern Application. The word *chimerical*, derived from *Chimaera*, has come to be applied to any idea or plan that is wild or fantastic.

CHIMBORAZO, *chim bo rah' zo*, an imposing mountain of the Andes, located in Ecuador, about 120 miles from the Pacific coast. Viewed from a distance, it is a magnificent sight, rising 20,408 feet above the level of the sea, and perpetually snow-covered from the summit down half a mile. It is an extinct volcano, but

has no crater. For a long time Chimborazo was thought to be the loftiest mountain in the New World, but there are eight higher peaks in South America; Aconcagua rises 23,080 feet above sea level. Many men attempted to reach Chimborazo's snow-capped peak, called Silver Bell, before the first successful ascent was made in 1880.

CHIMES. See BELL, subhead.

CHIMNEY.

Warm air, being lighter than cold air, tends to rise. When warm air is confined within an enclosure open at the top and bottom, a strong upward current fills the space.

As the warm air rises, cold air rushes in through the opening at the bottom of the shaft; in this way a draft is created which supplies the fire at the foot of

Photo Visual Education Service
CHIMPANZEE

Photo P & A

THE PET OF THE ZOO

The chimpanzee named Bondo, in the garb of man, is an attraction in the San Diego (Calif.) Zoo.

the chimney with the oxygen it needs to support combustion. Chimneys, therefore, do

more than carry off the smoke from a burning mass of wood or coal. They are built for utility, and not for ornament; they must extend higher



CHIMPANZEE HAND AND FOOT

than the topmost part of the building, or counter drafts may blow down the chimney.

CHIMNEY SWALLOW, an incorrect designation for the chimney swift. See SWIFT.

CHIMPANZEE, *chim pan'* ze, or *chim pan-*

ze', a large African ape, of the same genus as the gorilla, the two being closest to man of the anthropoid apes (see APE; GORILLA). The face and hands of the chimpanzee are flesh-colored, or yellowish, the teeth beautifully white, the ears very large. The body is covered with long, shining, dark-colored hair. In one species the crown of the head is bald. When full grown, the animal is sometimes five feet high. It does not often stand erect, but usually supports itself in an upright position by its long forearms. A wanderer in habit, the chimpanzee lives in dense jungles, where it climbs to the tops of the trees, eating soft fruits, insects, and birds' eggs. At night its loud, terrific, long-drawn cries can sometimes be heard for a mile or more. Chimpanzees are easily tamed, and are docile if kindly treated. Those seen in menageries, vaudeville, and moving pictures often show marvelous intelligence. In French West Africa, capture of chimpanzees is under government control. See illustrations, page 1383.

M. J. H.

Scientific Names. Chimpanzees belong to the family *Simiidae*. The several species constitute a genus which has been variously named *Pan*, *Trogodytes*, *Mimetes*, and *Anthropopithecus*.



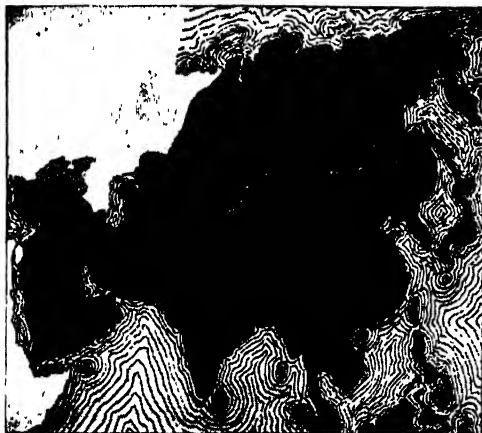
CHINA, the largest country of Asia, and one of the oldest on the globe that still exists as a nation. Long before Rome was founded, it is believed, China was a flourishing nation, with its arts, its government, and its peculiar family traditions well established. Through all the centuries until the nineteenth, it remained a shrouded nation, shut off from intercourse with other peoples; even to-day it is probably the least understood of all the nations, and most of the statistics which are given for it are little more than estimates. For thousands of years a monarchy of the absolute type, for nearly four years a republic, at least in name, then by a sharp reaction, a monarchy, then reverting to the republic again—such has been the history of this country, which is called by its own people *Chunghua*, meaning *Center of Civilization*.

China thinks in centuries. A man's life is a prolongation of that of his father and his countless grandfathers, and he is certain that his own progeny will transmit the individual in

him down through eternity. Countless ages he extends backward through his ancestry, and through countless ages he believes he will live in his posterity.

Location and Size. China comprises most of eastern and southeastern Asia, and its area of 4,278,000 square miles (estimated) comprises somewhat more than one-fourth of that vast continent. It is a million square miles larger than the United States; indeed, it is larger than the United States, Mexico, and Central America combined. It is larger than all of Europe. These statements, however, are made on the assumption that China's title to Mongolia and Manchuria remains valid. Mongolia has declared its independence, and Russian and Japanese influence in Manchuria has put Chinese authority in jeopardy. In all the world, only Soviet Russia (which includes Siberia) and Great Britain and France with their colonial possessions surpass it in size. No census has ever made possible a statement of the exact population, but the Chinese Post-

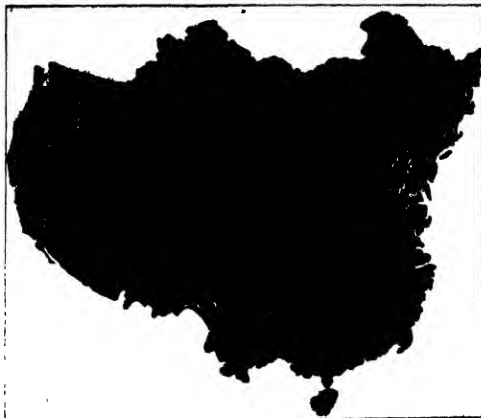
office Census places it at about 446,000,000—a population greater than that of any other single nation on the globe, and actually twenty-six per cent of the world's population. Eighty-five per cent of the people live in one-third of the



LOCATION MAP

Showing, also, the proportion of the Asiatic continent occupied by China.

area; the country is not over-populated, but distribution of the people is not even, owing to lack of transportation. In China proper, the people number 436,000,000. The entire population of the British Empire is greater, but it is scattered all over the world, and is of every



COMPARATIVE AREAS

China and the United States drawn to the same scale color, temperament, and language, while that of China is compact and almost a unit as to race; but in language there are hundreds of dialects.

Of this vast population, over ninety-five per cent live in what is known as China proper, which comprises only about one-third of the entire Chinese republic. Between this compact

southeastern portion and the other countries of Asia lie the great Chinese provinces of Tibet, Chinese Turkestan, Mongolia, and Manchuria, all of which are, either in their climate or in their soil, inhospitable enough to be real barriers against invasion. These buffer states account in large measure for the degree to which China has been able to keep itself untouched by influences from the outside world.

Physical Features. In no other country is the importance of rivers more evident than in China. From the mountainous inland regions they flow to the Pacific in roughly parallel



AREA AND LATITUDE COMPARISONS

China and the United States drawn to the same scale.

courses, and in their fertile valleys is crowded together a large proportion of the inhabitants. Only two of these river basins—that of the Yangtze, or "Great River," and that of the Hwang, or the "Yellow River"—form great plains, the rest of China being largely mountainous. Both of these rivers, springing from the mountain section, where snow is heavy, are subject to floods which keep the near-by lands constantly fertile, but these floods have other and less beneficial results. Sometimes they are so vast that they sweep away the wonderful works built to hold the river in its course, bring death to thousands of people in their basins, and by widespread destruction of crops cause famine through the land. The Hwang, which in twenty-five centuries has altered its course eleven times, is especially treacherous,

	AREA-Millions of Acres					PRODUCTION-Millions of Tons				
	10	20	30	40	50	10	20	30	40	50
RICE China U. S.										
WHEAT China U. S.										
SORGHUMS and M China U. S.										

CEREAL PRODUCTION COMPARISONS

The area and production of rice in the United States is insignificant compared with that of China. The latter country produces less wheat, but more sorghums and millet, than the United States.

and by its devastating floods has won for itself the name of "China's Sorrow."

In the north, west, and south are mountains, those of the west being the highest. By no means all of this mountainous section is lost to cultivation, for the Chinese have shown marked ability in adapting themselves to their environment. The southeastern mountains, steep in their higher slopes, are cultivated only to a height of 2,000 feet or thereabouts, but in the north, where the valleys are filled with a peculiar fertile soil called loess, the mountains are often terraced to a height of 8,000 feet. This inland mountain region is almost unknown to travelers, except the most determined and enterprising of them, and contains none of the great cities. These, for the most part, are situated along the coast, which is 2,500 miles in extent, or on the rivers; and the rivers near a great city present a remarkably busy and crowded aspect.

Of lakes, China has a number, though none of great size or importance. Practically all of them are near the Yangtze, and most of them are shallow and in danger of being filled up with silt from the river floods. The Chinese are a most ingenious people, and in certain of the lakes they have fashioned artificial floating islands, which are among the sights that travelers flock to see.

Climate. Nowhere is the statement that a "temperate climate is one which shows extreme heat in summer and extreme cold in winter" better illustrated than in China, for though almost the entire country lies within the north temperate zone, the extremes of heat and cold are great, except upon the seacoast. This is accounted for by the fact that it is part of a very large land mass, a "continental climate" always showing much greater variations than does one affected by great bodies of water. In the northern part of China, the average temperature for the year is about 51°; in the south, about 79°; and the annual range is

twice as great in the north as in the south. The summer months throughout much of the country are very hot, while in the winter the rivers are frozen through a great part of their courses.

Most of the rainfall occurs during the summer season, but this is by no means evenly distributed over the country. In the south, near the coast, it is frequently 100 inches a year, while at Peking, in the north, it rarely reaches twenty-five inches.

Plants and Animals. As might be expected in a country of such great size, the plant life of China is widely varied. The very name associates itself in the mind with certain plants—tea, the opium poppy, the mulberry, and rice. These are widely cultivated, and are treated under the heading of *Agriculture*, below. Of the plants which the Chinaman finds ready to his hand by the gift of nature, by all means the most important is the bamboo, which he could no more do without than the people of the West could do without iron and its products. But he uses bamboo in more ways than iron is used—he eats the young sprouts, fashions a great deal of his furniture out of the full-grown reeds, builds houses and boats in which to live, and makes paper from it.

Over large regions, however, the forests have been cut down, and vast, desolate stretches are clothed only with a tough grass. It is not that the Chinese do not appreciate the beauty of trees—it is simply that they must use every resource at their command. Perhaps the land is capable of cultivation—then assuredly the trees must come down; if not, wood is always good for burning, and the trees must come down, anyway.

It might be surprising to learn how many of the commonly known fruits and flowers are Chinese in origin. Not only the various species of the azalea and the rhododendron, but the peach and the orange as well, have been introduced elsewhere from China. For centuries the

Chinese have had their skilled gardeners, and no Western country has brought about more wonderful developments of flowers than has China, with the chrysanthemum, for instance. But it is only the wealthy who can have flower gardens; the poorer classes have no spot of ground, however tiny, which they can spare to grow anything that cannot be eaten.

In the wild mountain regions, there are still to be found tigers, leopards, bears, and wolves, while in the southwestern extremity, near Burma, the elephant and the rhinoceros are frequently seen. Over much of the country, however, the large game has been driven out, but hares, rabbits, squirrels, rats, and mice are everywhere abundant, and the bird family is very numerous. Almost more important than the birds, which include geese, ducks, and other species used for food, are the fish, for China is one of the greatest fish countries of the world. Particularly interesting is the use made of cormorants in fishing (see CORMORANT).

Agriculture. For thousands of years the land of China has been cultivated, and during much of that time has supported a huge population, yet its fertility is not exhausted, and China is still primarily an agricultural nation. This tells much about the methods that are employed. Primitive they may be, but they tend to conserve the elements of the soil. A Chinese city has no drainage system, no garbage-disposal problem. In the early morning hours, before dawn, the farmers' boats enter the canals of

the city and glide here and there, collecting the refuse of every sort for fertilizing purposes.

Farming is held in high honor. The government really owns the land, and has a right to eject any man from his holding if he does not till it carefully. Most of these holdings are small, comparatively few being over ten acres, but from these little patches excellent returns are received—excellent, that is, from the viewpoint of the Chinese, who do not demand much beyond the necessities of life. No patch of ground is too small to claim attention. If a man has in his holding a rocky ledge, however small, which is level enough to retain earth, he will carry earth in a basket, cover the ledge, and there set out his plants. Thus he adds to the productivity of his bit of land.

Nor are these their only space economies. Large rafts are built, covered with earth, and moored in the river. There the farmer plants his seed in early spring, and as the raft drifts slowly down the river, the crops grow and ripen. The picture is an attractive one to a person who has not seen the original, and gives the impression of a lazy, luxurious people who cannot even stay at home to grow their crops. But the truth is far otherwise. The Chinese peasant is the hardest-working man in the world, and only the dire necessity of finding a place to live and grow the things he needs for food forces him into such expedients. Hundreds of thousands of Chinese live on river boats, and have no other homes.



Photo. U & U

PLANTING CORN IN CHINA

There is such a surplus of labor, such a scarcity of leather, and such dependence on traditional customs that in lieu of reins to guide the donkey, a boy leads him.



Photos: Visual Educational Service; O R O C

Some Phases of Industry. (1) Converting timber into lumber (man power is cheaper than machinery). (2) Interior of a native bank; the strange material displayed is money. (3) A village mill, grain for the community is ground into flour in this crude fashion. (4) A street restaurant.



Photos: Visual Educational Service; O. R. C.

Some Phases of Industry. (1) Converting timber into lumber (man power is cheaper than machinery). (2) Interior of a native bank; the strange material displayed is money. (3) A village mill, grain for the community is ground into flour in this crude fashion. (4) A street restaurant.

attempted to curtail still further the traffic in opium, without result.

Of one phase of agriculture, China knows nothing, and that is stock-raising. Pigs and chickens may be seen, for they can subsist on refuse and live in the dooryard of the little thatched mud hut which shelters the family. But cows, sheep, and horses must have grazing land, and land is too valuable to be used for such purposes. There are no grassy commons on which the cows of the villagers may be tethered; no roadside stretches where they may crop the weeds, for every spot is under cultivation.

The effects of this lack of animals are many. Not only do the people have little meat to eat, but they know nothing of milk or of butter. And even more serious is the scarcity of draft animals, for it means that men must pull the carriages and bear the heavy burdens, thereby injuring their health and shortening their lives. A Chinese coolie can do draft work more swiftly and more easily than could an American or a European, but after all, he is a man and not a horse, and he inevitably pays the penalty with relatively short life for the too-hard work which is laid upon him.

Manufactures. That the Chinese are not behind other races in their inventive faculty is proved by the fact that they were the first to use gunpowder, paper, silk, movable blocks for printing, porcelain, the magnetic needle, and many other things which were later introduced into Europe or independently discovered there. But in the later centuries, the inventive faculty has been hampered by the conservatism and ancestor worship so characteristic of China. No premium is placed on the discovery of new and simpler methods—the acceptable thing is to carry on a process just as it has been carried on in ages past. Thus it happens that the Chinese have been slow to introduce machinery, and many of their products continue to be made in the homes of the people or in very small establishments. Even so, their silk is better than any made elsewhere, while their embroideries are marvels of beauty and skill. Cotton mills are multiplying rapidly, however, and at present there are 3,500,000 spindles in operation.

Gold and silver filigree work, lacquer ware, wood and ivory carving, and bronze casting show not only the remarkable ability of the people, but their artistic sense as well. In recent years, great quantities of modern machinery have been introduced into factories in the cities, and some of the old hand-work, as the most intricate embroidery and carving, has been forbidden by law because of its bad effect on the eyes. Certain stu-

dents of economic questions have expressed the fear that the time may come when Chinese factories will be able to produce goods so cheaply that American and European products cannot compete with them, for the Chinese laborer has to be content with a wage of a few cents a day.

Important Mineral Resources. That mineral deposits are enormous has long been known, but the research made has not been thorough enough to determine their exact extent. Of chief importance is coal. About twenty miles south of Mukden is the largest strip mine in the world. It is ten miles long and two miles wide, and the seams are from seventy-eight to



Photo Visual Education Service

WHERE MAN POWER IS CHEAP

Chinese coolies pulling a vessel up-stream.

480 feet thick; 7,000 tons of bituminous coal are taken from it daily. China produces seventy-five per cent of the world's antimony.

Iron, too, occurs in great quantities, some of it so near the coal fields that considerable iron industries have sprung up; but mining, like most of the other industries of China, has never reached a high stage of development because of a lack of transportation facilities. If metals exist near the great waterways, well and good—they can be transported with ease and widely used; if not, they are of service only in the sections in which they are found. Apparently inexhaustible beds of kaolin, or porcelain clay, early gave rise to the china-making industry, and this clay still forms one of the most valuable mineral resources.



Photo Visual Education Service
A YOUNG EXPERT WITH
THE CHOP STICKS

Some gold, silver, copper, and lead are mined by primitive or surface methods, but how rich the deposits may be has never been determined.

Commerce and Transportation. Though China has long had commercial relations with foreign countries, it was only after the opening of the treaty ports, in 1842, that its foreign commerce became extensive. To-day its foreign trade amounts to about \$1,800,000,000 annually, the imports making up nearly two-thirds of that amount. By far the largest exports are silk, raw and manufactured, while cotton and cotton goods, kerosene, and tobacco constitute the chief imports. Everywhere in China are to be seen the blue cotton garments of the people. Though China is a million square miles larger than the United States and has four times as many people, it uses only one one hundred-eightieth as much steel and only one one hundred-fiftieth as much cement. The foreign trade is carried on in sixty-nine cities known as treaty ports, some of them on the coast, some hundreds of miles inland on the great rivers. There are also eleven voluntary open-trade marts.

Of the vast interior trade of China, it is impossible to make even a fair estimate, and it is carried on under difficulties. In the well-settled parts of the country, there are many roads, built centuries ago, but these are in very bad condition, for the Chinese expend no energy in repairing them. There are fewer than 10,000 miles of roads on which automobiles can be run. Some of the towns have paved streets, but out on the plains and between the villages, especially in the rice zone, the farmers have gradually encroached upon the roads until to-day mere footpaths are left, wide enough for a man with a pack or with a wheelbarrow, but not for vehicles. The reason for this backwardness of transportation is that the Chinese believe that in isolation lies their safety.

Railway-building has made but comparatively slight headway, for the government from the first set itself strongly against it. The people, too, objected, for the desired right of way often ran through graveyards, and to desecrate a grave is to the Chinese the height of impiety. But every line of railway built thus far has proved its value. Railroads connect the largest cities, but in the entire country the mileage is only 7,700. There is no other land in the world where the influence of transportation is so apparent as in China. Where railroads run, produce is easily distributed; elsewhere dire famine may abound because food cannot reach the people.

The great highways of China are the rivers and canals, of which there is a network all over the country. On all the large rivers, but especially on the Yangtze, the volume of trade has steadily increased until the waterways literally swarm with boats, junks, and barges

of all sizes. Probably there are as many boats in China as in all the rest of the world together. Thousands and thousands of people pass their lives in houseboats or sampans, and great stretches of the rivers are so crowded with these along the shore that no water shows between.



Photo OROG

ADVERTISING FOR A LOST MAN

The town crier engages in a man hunt. The relatives of a person who has disappeared employed a man to go through the city streets to read the message on the banner to the crowds whom the beating of the gong would attract. The message, loosely translated, reads. Special Notice. Please pay attention. There is a man named Tung Kwei Hwang, belonging to the district of Leiyang (Hunan province). He is a share broker, coming to Changsha for the first time a few days ago. He stayed at the Double Honor Hotel, Sin An Street, and went out on the 21st inst., to buy more share certificates, when he was lost. Whoever has seen this man will please let me know.

These are not luxurious houseboats, but have cabins of one small room, which are satisfactory enough in good weather, but leave much to be desired during the cold and the rainy seasons.

The People and Their Mode of Life. The Chinese are a Mongolian people, with the yellowish skin, straight black hair, obliquely set, almond-shaped eyes, and high cheek bones characteristic of that race. In general they are of rather low stature and have small hands and feet, but variations in physical structure

are to be seen in the different parts of the country. Many of their moral qualities are excellent. For example, they are unusually industrious, and they toil constantly for the support of their families; they are strongly attached to their homes; they hold age in great respect, and are capable of loyalty to the point of martyrdom. Gambling is common among them, and opium-smoking was long a dreadful curse, but it has been decidedly lessened through the efforts of the government.

Family Life. Marriage is universal, and takes place at a far earlier average age than in any American or European country. A youth does not wait until he can support a wife. He simply brings her home to his father's house, and there she has her share, meager enough in the case of the poor, of the family rice. Families are large, for the number of his sons is the thing upon which a man most prides himself. And so long as the social system remains as it is, so long as China is "ruled more from the cemetery than from the palace," men will desire sons to live after them and honor them, and population will know no decrease. The death rate, however, is high.

In general, the men and women of the household are kept separate. In the interior, at least, the women have practically no social advantages. In the past, not one in a hundred after marriage traveled far from the house to which she was brought as a bride. In part, this was because it was so difficult for them to walk, owing to their bound feet. Lest a girl might not find a husband, her parents bound her feet while she was but a child, for tiny feet were considered a mark of beauty and aristocracy. This took place not only among the wealthy and fashionable, but among all classes. However, it may be positively stated, to-day the practice of foot-binding is over; penalties are now laid against any family permitting it.

What the Chinese Eat. It is a common saying that a Chinese family could live on what an American family would not eat, and while it may not be literally true, it is most suggestive of the real condition of the people. Prof. E. A. Ross, author of *The Changing Chinese*, puts it graphically:

The sea is raked and strained for edible plunder. Seaweed and kelp have a place in the larder. Great quantities of shellfish no bigger than one's finger nail are opened and made to yield a food that finds its way far inland. The fungus that springs up in the grass after a rain is eaten. Fried sweet potato vines furnish the poor man's table. The roadside ditches are bailed out for the sake of fishes no longer than one's finger . . . After their work is done, horses, donkeys, mules, and camels become butcher's meat.

Tea is the universal drink, taken not with the meal, but just as water is drunk elsewhere. Nor is a love for tea the only reason for this large consumption. Where people are so

crowded together and all care for sanitation is lacking, only boiled water is safe for drinking, and this the tea makes palatable.

Language and Education. The Chinese language has no alphabet, for it is not a *letter* but a *syllable* language. Each written character represents not a sound, but a word of one syllable, for no Chinese word has more. Thus a Chinese child learning to read must learn not twenty-six letters, as in English, but characters



Photo: Visual Education Service

IN A NEWSPAPER OFFICE

The type room of a native Shanghai newspaper. The man in what seems to be a pit is surrounded by type cases containing the thousands of characters in the Chinese language.

standing for every word he ever hopes to use. Out of the 44,449 word-characters contained in the dictionaries, however, even a well-educated man needs fewer than 3,000. To-day, revisions of the vast list of characters have reduced the number of symbols to the above-mentioned 3,000. As the same word may stand for a number of different ideas, according to its position in the sentence, and as each sound may be pronounced in a number of different tones, each of which has a different meaning, the language is one of the most difficult in the world for a foreigner to master. When written, the characters are placed in columns, not in lines, and are read from top to bottom, and from right to left.

Education is held in high honor among the Chinese, but their ideas as to what constitutes education are steadily changing. In the old China, before it became tinged with the notions of Western peoples, there was a special class which devoted itself to study, with the object of passing the examinations which alone could admit to public office. These examinations were held throughout the country at stated times, and concerned themselves only with literature and philosophy—subjects which did not necessarily fit men to discharge their official duties well.

In 1905, however, the old formal examinations were abolished, and strenuous efforts are being made to introduce a system of education on a Western basis. Primary and secondary schools have been established, grading up to

institutions of higher learning, the whole system culminating in the universities, of which there are about five or six. As yet, however, education is by no means widespread. Probably ninety-five per cent of the people have no knowledge of reading and writing, or just enough for actual necessities of life. All Chinese, however, are conversant with estab-



IN THE HALL OF CLASSICS

A few of the 300 stone steles (pillars with inscriptions) comprising the complete texts of the Nine Chinese Classics, in Peking

lished chops (trade-marks), and by these they are able to distinguish one article from another. Only of late years have the Chinese been brought to look upon women in general as important enough to deserve even to know how to read, but women of the better classes were taught to read and write even in old China.

Religion. Religion plays a great part in the life of the Chinese, but it is a religion of superstition rather than of spiritual appeal. Temples are numerous, shrines are in every house, but fear of demons and not love of deity is the dominant feeling. Mohammedanism has made about 20,000,000 converts, Christianity fewer than 1,500,000, and the rest of the people profess Taoism, Buddhism, Confucianism, or a mixture of the three. In 1914 a strong effort was made to adopt the last-named as the state religion, but the attempt failed. Ancestor worship, growing out of Confucianism, is the controlling factor in Chinese life. It has led to lack of progressiveness, for only those things which were done in ancestral times are honorable.

History of China

The Chinese claim for themselves a history that reaches back for fifty centuries or more, and the closest student can find nothing that absolutely denies the possibility of this. There are, however, no monuments or pyramids, as in Egypt, to prove conclusively the antiquity of the nation, and not until about 1125 B.C. can their history be regarded as really authentic. Confucius, it is true, begins his record with an emperor who is supposed to have reigned from 2357 to 2306 B.C., but Confucius

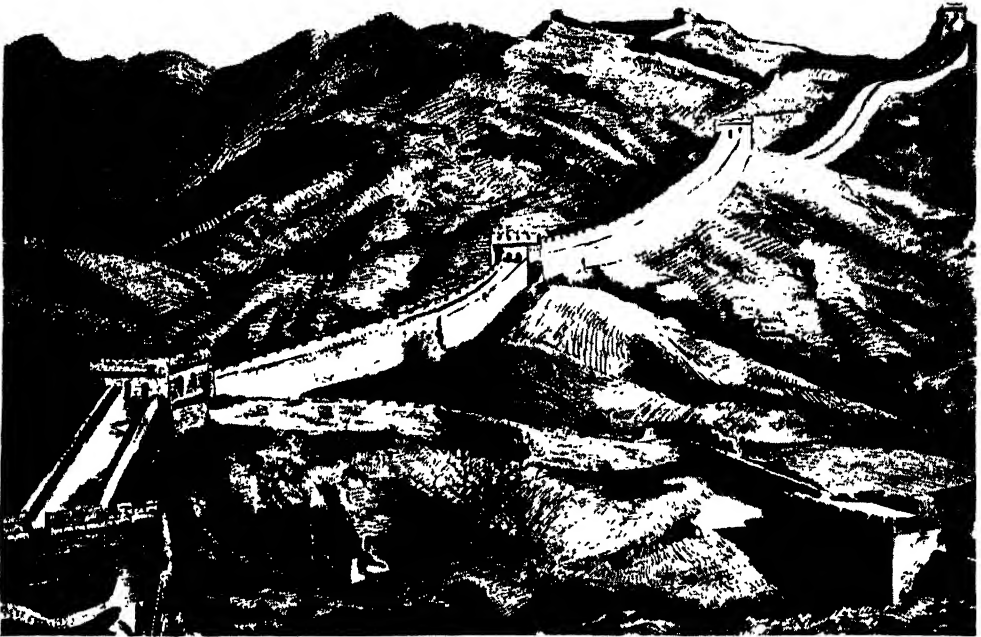
took his statement from earlier records which were far from being historically accurate.

Early Historical Period. With the Chow dynasty, which began to reign in 1122 B.C., better times dawned for the country. The people changed from the wandering, or nomadic, life to a settled existence, and began that careful cultivation of the soil which has gone on unbrokenly until to-day. A feudal system grew up; the great land-holders acquired fiefs so large that they were practically separate states, and thus China became in effect a confederation rather than an empire in the true sense of the word. The emperor, however, remained the real head, politically as well as religiously.

The first date that is known with accuracy in Chinese history is during this Chow dynasty—August 20, 776 B.C., according to Western chronology; for on that day occurred an eclipse, the account of which a Chinese poet preserved. The great feudal states, each jealous of its rivals, kept up a constant strife which so disturbed the empire that finally, in the third century B.C., the Chow dynasty was overthrown by the Tsin, or Chin, dynasty, from which China takes its name.

Though this dynasty ruled for less than half a century, it accomplished certain notable things. The Great Wall of China, which is the most stupendous structure ever built by man, was erected to keep out the Tartars, and the feudal system was abolished. The emperor who performed this latter service was so anxious that his own reign should go down in history as the beginning of the empire, and especially that none of the feudal heroes should be kept in mind, that he had all the literature dealing with previous ages destroyed, and put to death hundreds of learned men. After the overthrow of the Tsin rulers, dynasty after dynasty reigned, some of them doing much for the country, others fomenting strife and bloodshed. There were ages of invention, ages of literary activity, and occasional dealings with outside countries, as Japan, Persia, and Korea. Through them all, however, China was crystallizing into the conservative, tradition-loving nation, which, to a large extent, it still remains. Printing was invented in the tenth century A.D., and the practice of binding the feet of women was introduced about the same time.

But a great change was coming to China. In the thirteenth century, the Mongols, under Genghis Khan, swept over the country, and under Kublai Khan, grandson of that conqueror, established a firm rule. Never before had China known such prosperity and splendor as it knew then. Marco Polo, a Venetian traveler who visited China, or, as he called it, Cathay, brought back glowing accounts of its high civilization, and Italy established certain commercial relations with its merchants (see



GREAT WALL OF CHINA

This is the most colossal line of defense in the world, a wall over 1,500 miles long, extending between Mongolia and China proper. It is called in Mongolian the *White Wall*, and in Chinese *The Wall of 10,000 Li*. In the third century B. C. a crude earthwork was erected against the inroads of the Tartars; this was supplemented by the present wall, which recent investigations establish as dating only from the latter part of the fourteenth century. The structure is about twenty-two feet high, and twenty feet broad, with towers at intervals of a few hundred yards. The immensity of this engineering feat impresses one when it is realized that the wall is as long as from New York City to Omaha, or from the city of Quebec to Winnipeg. It is built of brick or dressed granite shell, filled with earth and covered with a very hard coating of bricks in lime. It follows a winding course over mountains and through valleys, and is still in a fair state of preservation for hundreds of miles. At a point near Kalgan it has been cut through to admit the railway line from Peking.

POLO, MARCO). The Mongol dynasty, never popular with the Chinese, was overthrown in 1368 by the Ming dynasty, which reigned for almost 300 years, and permitted the Portuguese and Spanish traders to enter the country and settle at its ports.

Early Modern Period. During the latter part of the Ming rule, rebellion was rife, the very throne being menaced, and finally, in 1644, the Manchus were invited into the country to establish order. Their object accomplished, the Manchus refused to leave, but took Peking, proclaimed a Manchu prince emperor, and founded the last royal dynasty of China, which continued nearly 300 years, until the formation of the republic, in 1912. For a time the Chinese refused to submit, but opposition gradually died out, and the conquerors were merged with the original inhabitants of the country. One sign there was of the subjection of the Chinese—they were forced to adopt and to wear continually the *queue*, or “pigtail,” introduced by the Manchus. For two centuries internal progress went on slowly, as progress has always taken place in China, and still the outside world knew little of the great nation with its

strange mixture of advanced civilization and skepticism about anything new. Unable entirely to avoid trade relations with Europe and America, the Chinese submitted to them as little as possible, and made it difficult and even



Photo ORO C

LEGATION WALL

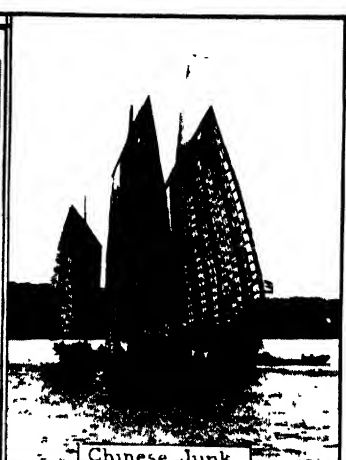
A section of the wall which surrounds the foreign diplomatic offices in Peking. The Western world viewed with apprehension the removal of all Chinese government offices to Nanking.

dangerous for “foreign devils” to enter the country. But the Western nations were not prepared to submit tamely to the regulations which restricted their trade, and before the middle of the nineteenth century, they had

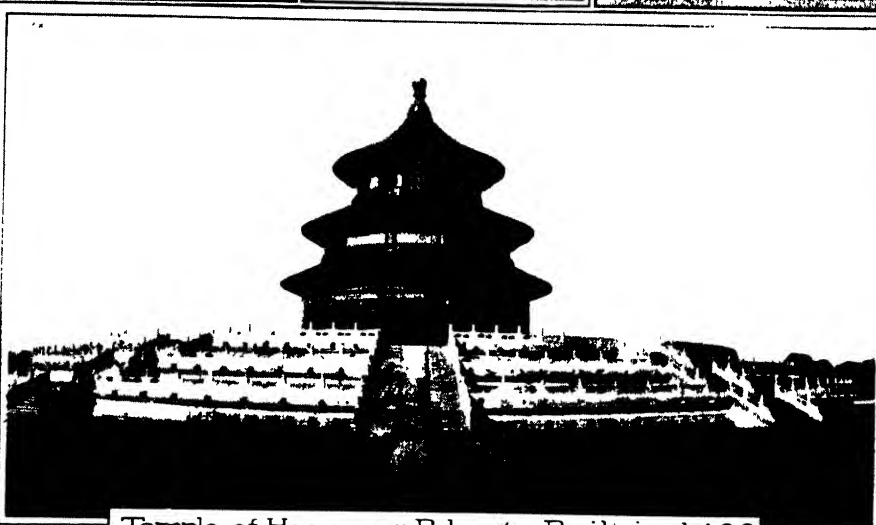


North China Daily News Bldg.

A Chinese Garden



Chinese Junk



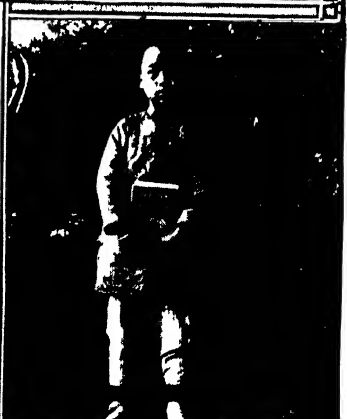
Temple of Heaven, in Peking. Built in 1420



Chinese Actors



A Manchu Lady and Child



College Student, Age 11

begun to show China that a change in attitude was expedient.

Increased Intercourse with the World. Unfortunately for the credit of the European nations, the first sharp dispute with China was over the opium question. Late in the eighteenth century, opium traffic had been declared illegal by the Chinese government, but the decrees were not really enforced until 1839, and then the attempts at enforcement met with protest from the British government. For the opium trade was worth millions of dollars annually to Great Britain, and could not lightly be relinquished. Finally, in 1840, actual war broke out, and at its close China was compelled to surrender the island of Hong Kong, pay an indemnity of \$21,000,000 and open to British trade five of its chief ports. The treaty made no mention of the opium trade. Two years later, the United States and France also made trade treaties with China. In 1856 China again roused the wrath of Great Britain by refusing to apologize for the seizure of a Chinese boat flying the British flag, and again war resulted. With France as its ally, Great Britain actually took Peking, and in 1860 secured by the treaty of peace increased trading privileges and the promise of toleration for the Christian religion.

In the meantime, China had been disturbed by a severe rebellion, which had grown out of the attempt of a half-mad fanatic schoolmaster to overthrow the Manchu dynasty and establish himself as the Heaven-sent head of the nation. Everybody who had a grievance flocked to his standard, and by 1853 the rebellion had reached great dimensions, Nanking having been seized as a capital and Hung-siu-tseuen proclaimed as the head of the Peace dynasty. From his watchword, *Ping*, or *peace*, and the word *tai*, or *great*, this upheaval is known as the Tai-Ping Rebellion. The Chinese government suppressed it, and in this struggle Frederick Townsend Ward and Charles George Gordon, or "Chinese" Gordon, greatly distinguished themselves. See GORDON, CHARLES GEORGE.

Relations with Japan. Korea was always a debatable ground between China and Japan, and in 1804 the difficulties concerning it brought about open war between the two powers [see JAPAN, (History)]. From the first, Japan had the upper hand, and after a complete victory was able to wrest from China a treaty guaranteeing Korean independence, giving up to Japan the island of Formosa and the Liaotung Peninsula, with the strong fort of Port Arthur, and promising a huge indemnity. Foreign powers intervened and made Japan relinquish much of its gains, but they also used the opportunity to secure from China increased commercial privileges, and it became evident that their aggressions were likely to go beyond this.

The Era of Internal Reform. Sadly weakened by the war with Japan, China stood in need of thorough and immediate reform, but how this was to be secured remained uncertain. For a time it looked as though the young emperor, Kwang-su, with the aid of the reform party, might bring China into closer relationship with other nations, but the reactionary influence of his aunt, the empress dowager, was too strong. Gradually she drew almost all the power into her own hands, and violent anti-foreign demonstrations were the immediate result. These culminated in the famous Boxer Rebellion, tacitly encouraged, at least, by the empress dowager. Even the empress dowager could not fail to derive some lesson from the disastrous effects of this rising and the attitude of the powers toward it; for the rest of her life she adopted a different attitude.

But the need for reform was greater than ever, and wise statesmen began to see and declare the necessity of introducing Western methods. Somehow, just how is not clear, a new national spirit was awakened, and public opinion began to demand constitutional reform. The absolute monarchy which had served for forty centuries no longer satisfied, and at length a commission was appointed to study the representative forms of government in foreign countries with a view to determining the one best fitted for China. In 1908 an edict signed by Emperor Kwang-su outlined a constitution and promised a parliamentary government within nine years; but this was too slow to suit the public demands, and when, later in the same year, the emperor and the empress dowager both died and the infant Pu-yi succeeded, discontent became outspoken. The provinces elected assemblies in 1909, and two years later, the government, which had been forced to submit to the establishment of a responsible Ministry, promised a Parliament in 1913.

But a radical element which had grown up among the reformers refused to be satisfied with any such halfway measures, and demanded the abdication of the emperor and the establishment of a republic. Rioting and later organized revolution resulted, and the revolutionists spurned the suggestions of Yuan Shi-kai, newly appointed Premier, for a constitutional monarchy. With Shanghai, Nanking, Hankow, and other cities in their hands, with Canton a self-proclaimed South Chinese republic, and one province after another declaring its independence, the revolutionists were able to enforce their demands and bring about the organization, in December, 1911, of a provisional republican government. Dr. Sun Yat Sen was elected provisional President, and the child emperor was compelled to abdicate. In February of the following year, Yuan Shi-kai was elected first President, with powers to or-

OUTLINE AND QUESTIONS ON CHINA

Outline

I. Location

- (1) Latitude, $18^{\circ} 50'$ to $53^{\circ} 25'$ north
- (2) Longitude, 74° to 135° east

II. Size

- (1) Greatest length, east to west, 3,000 miles
- (2) Greatest breadth, 2,400 miles
- (3) Actual area, 4,278,000 square miles
- (4) Comparative area
 - (a) Larger than all of Europe
 - (b) Compared with Canada and United States
- (5) Distinction between Chinese republic and China proper

III. Surface and Drainage

- (1) Mountainous sections
 - (a) Cultivation
- (2) River basins
 - (a) Parallel course
 - (b) The two great rivers, the Yangtze and the Hwang
- (3) Destructiveness of rivers
- (4) Lakes
 - (a) Floating islands

IV. Climate

- (1) Extremes of heat and cold
- (2) Variations in temperature
- (3) Rainfall
 - (a) Uneven distribution

V. Vegetable and Animal Life

- (1) Best-known plants
- (2) Importance of bamboo
- (3) Forest areas
- (4) Absence of trees in certain localities
- (5) Fruits and flowers of Chinese origin
- (6) Game animals
- (7) Birds
- (8) Fish

VI. Industries

- (1) Agriculture
 - (a) Fertilization of soil
 - (b) Irrigation
 - (c) Intensive methods
 - (d) Cultivation of hill country
 - (e) Floating farms
 - (f) Crops
 - 1. Rice
 - 2. Tea
 - 3. Mulberry
 - 4. Other plants

- (g) Absence of stock-growing
- (2) Fishing
- (3) Manufacturing
 - (a) Introduction of machinery
 - (b) Industries in the home
- (4) Mining
 - (a) Coal
 - (b) Iron
 - (c) Kaolin
 - (d) Other minerals

VII. Communication

- (1) Navigable rivers
- (2) Canals
- (3) Railroads
- (4) Roads
- (5) Commerce
 - (a) Imports and exports
 - (b) Internal trade

VIII. The People

- (1) Physical and mental characteristics
- (2) Family life
 - (a) Effect of large population
 - (b) Position of women
 - (c) Food
- (3) Language
 - (a) A "syllable," not an "alphabet," language
 - (b) Written language
- (4) Education
 - (a) Old style
 - (b) New style
 - (c) Education of women
- (5) Religion
 - (a) The dominant faiths
 - (b) Effects of ancestor worship

IX. Government

- (1) Republican form
- (2) Extensive powers of President
- (3) The legislature
- (4) Local government

X. History

- (1) Antiquity
- (2) Early historic times
- (3) Mongol invasion
- (4) The coming of the Manchus
- (5) The opening up of China to the outside world
- (6) The Chinese-Japanese War
- (7) Reform demands
- (8) The establishment of the republic
- (9) Later history

OUTLINE AND QUESTIONS ON CHINA—Continued

Questions

Why does the climate exhibit greater extremes than would that of an island in the same latitude?

How do the Chinese manage to produce crops on arid hillsides?

What relation is there between the Chinese reverence for ancestors and the scarcity of railways in the country?

Which has the easier task in learning to read, a Chinese schoolboy or an English schoolboy? Why?

With what science is the first really authentic date in Chinese history connected?

What is meant by the term "Boxer," and what did the Boxer Rebellion hope to accomplish?

How is it possible that some day China will have no lakes?

What are the "floating farms"? Why are they necessary?

What effect has the overcrowding of the country had on the roads in country districts?

What does a Chinaman mean when he speaks of "golden lilies"? Of "a little insect"?

Why is tea drunk so widely and so copiously?

What third country was the occasion for war between China and Japan?

To what height are the northern mountains terraced and cultivated?

How is the garbage-disposal problem solved in a Chinese city? What effect has this on agriculture?

What is "pidgin-English"? Give an example.

Why would you not care to eat with a Chinese family of the poorest class?

Does the government resemble that of Canada or that of the United States in the relative amount of power delegated to the central government and to the individual provinces or states?

Why was Charles George Gordon known as "Chinese" Gordon?

What is "China's Sorrow"? Why is it so called?

Of what bird do the people make use in one of their important industries?

What has been the chief curse of the women of China?

How did Great Britain gain possession of Hong Kong?

Why was the country able to keep itself shut up, away from intercourse with other peoples, for so long a time?

Name two fruits, very familiar in North America, which originated in this Oriental land.

Why is the extremely fine, elaborate embroidery no longer made?

What has religion to do with the overcrowding in China?

How and when did a mode of hair-dressing become a symbol of subjection?

How does China rank as to size among the countries of the world? As to population?

Name four ways in which the Chinese would miss the bamboo if they were deprived of it.

Why are there almost no cows or horses to be seen throughout the country?

What great curse of the people has the government undertaken to abolish?

What does religion chiefly mean to the Chinese?

What do the Chinese call their country?

What was the object of the famous examinations to which Chinese students were formerly subjected?

What is the basis for the statement that man-power is cheaper than machinery?

In what condition is the Great Wall of China at present?

ganize the republic, and it seemed that China had given up its monarchy forever.

The Republic. The position of the new President was by no means entirely pleasant, for the lack of money was a very serious embarrassment, and only with the greatest difficulty was a loan of \$125,000,000 secured from five of the great powers. Yuan's method of securing this, without the consent of his Parliament, roused violent opposition, and a sharp rebellion, headed by Sun Yat Sen, was put down with some difficulty.

The republic had been established, seemingly, too suddenly; the people were not ready for it after their centuries under absolutism, and they failed to grasp many of its main principles. In fact, while a republic in name, the new government was practically a monarchy, and attempts of a parliamentary party to take the power into its own hands and make of the President a mere figurehead, led in the end to a large increase in Yuan's power. Finally, in November, 1915, an election was held by a specially constituted convention of "electors." The result was overwhelmingly in favor of restored monarchical government, but the empire was not proclaimed at once, because the European powers convinced China that such change during the great European war might endanger the peace of the Orient. It was finally decided to continue the republican form of government. In June, 1916, President Yuan Shi-kai died, and was succeeded by Vice-President Li Yuan Hung.

China remained neutral in the World War until 1917, although its aid had been volunteered earlier. Inspired, however, by the moral example of the United States in its declaration of a state of war, the Chinese republic declared war on Germany on August 14 of that year. The country sent no troops to Europe, but many thousand Chinese laborers went to France and labored with zeal, thus releasing an equal number of men from the allied armies for the fighting fronts.

Moved by the threats of Japan to withdraw from the Peace Conference in 1919, the makers of the peace treaty gave to Japan occupation and virtual ownership of the Shantung peninsula of China, where 40,000,000 Chinamen live. This section for a number of years had been dominated by Germany. Chinese envoys at the Versailles peace table refused to sign the treaty containing that provision, but the conference retained it. The United States Senate announced its objection to Japan's plans; in the armament conference at Washington (1921-1922), Shantung was given back to China.

For several years following, China was torn by civil war waged among three war lords, governors of the strongest provinces. From 1926 to 1928, Chang Tso-lin, war lord of Man-

churia and leader of the armies of North China, held Peking against the attacks of the Nationalists, who favored a united country. In June, 1928, Chang Tso-lin evacuated Peking without a fight and fled to Mukden, Manchuria, but on the way he suffered fatal injuries from a bomb explosion. Subsequently, the Nationalists gained control from Canton, in the south, to the Great Wall, beyond Peking, in the north. On June 15 Nanking was selected as the new capital, and the ancient name of the old capital was changed from Peking to *Peiping* (pronounced *ba' ping*). The Nationalist government was organized under ten executive departments, and American and German advisers were engaged to assist the Chinese in the difficult reconstruction problems that the country faced. The Nationalist President, Chiang Kai-shek, was inaugurated in October, 1928. In 1929 war with Russia over the Chinese Eastern Railway was narrowly averted. S.K.A.S.

Related Subjects. The following classified list will simplify reference to articles in these volumes which relate to China:

CITIES AND TOWNS	
Amoy	Kiao-chau
Canton	Nanking
Fu-chau	Ning-po
Hangchow	Peking
Hankow	Shanghai
Hong Kong	Tien-tsin
HISTORY	
Boxer Rebellion	Sun Yat Sen
	Yuan Shi-kai
ISLANDS	
Hong Kong	
LEADING PRODUCTS	
Bamboo	Opium
Coal	Poppy
Cotton	Rice
Indigo	Silk
Iron	Sugar Cane
Kaolin	Tea
Mulberry	Tobacco
MOUNTAINS	
Altai	Himalaya
POLITICAL DIVISIONS	
Manchuria	Tibet
Mongolia	Turkestan
RELIGIONS	
Buddhism	Mohammedanism
Christianity	Taoism
Confucius	
RIVERS	
Amur	Si-kiang
Hwang	Yalu
Mekong	Yangtze

CHINA GRASS. See BOEHMERIA.

CHINA PAINTING. The art of decorating china is a handicraft that makes its appeal not only to amateurs, but likewise to professionals. Due in part to the great advance made in materials and firing facilities, and in part to the vogue for the conventional in design, which has made it possible for very acceptable work to be done even by those unskilled in freehand drawing, its popularity has grown.

Special Paints for China. The pigments used in china painting are called *mineral paints*, because their bases are metals; and they are said to be *virifiable*, which means that in the intense heat of the kiln they will fuse—that is, attach themselves to the glaze of the china—and thus become an inseparable part of it. They come both in powdered form, contained in small bottles, and as a prepared paint put up in collapsible tubes. The latter pigments are more convenient, since they need only to be diluted with spirits of turpentine as used; but as they tend to grow hard in the tube, they are not so economical as the powdered paints, which are good indefinitely. On the other hand, experience is required to prepare the powdered colors properly, for too much oil not only attracts the dust in the air, but may cause blistering and “bubbling” when the china undergoes the kiln test.

Before applying the paint to the china, the brush is dipped lightly into what is called the *medium*, in order that the color may be smoothly worked. This medium is usually spirits of turpentine.

Brushes and Pads. Brushes called *square shaders* are considered best for general use and should figure in the collection in small, medium, and large sizes. There are also *blender*, *pointed*, and *tinging brushes*, *sable liners* for putting in the delicate touches, and various other kinds. A *pad*, or *pounce*, made of cotton covered with soft China silk, is used for tinting large surfaces and to some extent in blending. Brushes are quickly cleaned for use with a different color by dipping them into turpentine or alcohol, but the special ones kept for gold, enamels, and India ink should never be used for the colors.

Choosing the Design. The first essential of the design is appropriateness. It must harmonize both with the shape of the article and with its purpose. The design must also be adapted to the space it is to adorn. A small vase or jar decorated with an elaborate landscape looks overloaded and uninteresting, whereas a delicate spray of blossoms or leaves or an attractive conventional design would have made it a thing of beauty, artistic and harmonious.

Drawing the Outline. After the design has been selected, the next thing is to decide how often it is to be repeated. If one is painting a plate whose border calls for five applications or “repeats” of the design, the rim of the plate on the under side is accurately marked off into fifths by means of a cardboard measuring device called a *plate-divider*. Next, the plate is washed perfectly clean and then rubbed over with a cloth moistened with spirits of turpentine, which gives a surface to which pencil lines will adhere.

If the design is a simple one, it is frequently drawn freehand; if complicated, or if the

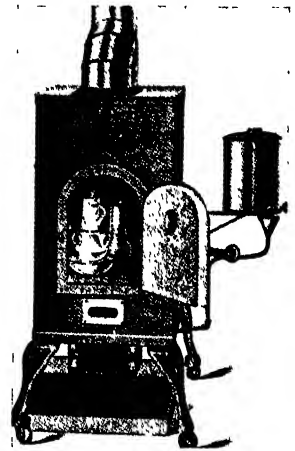
worker is not skilful at drawing, a tracing from copy is generally made on transparent tracing paper and transferred to the china by going over the lines with some sharp point, such as that of a hard lead pencil or an ivory stylus. Most painters then secure the drawing by re-tracing with India ink, applied with a pen or a very fine, pointed brush; or, if the finished work is to show an outline, this is put in at once with the mineral paints in the desired color, after which the piece is fired in order to fix the lines.

In either case, the outline is fundamental and must be carefully and accurately drawn.

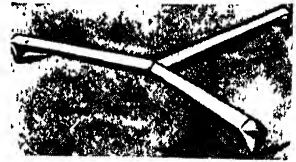
The Actual Painting. The next step is to make up or “set” the palette with the colors needed for working out the design. The worker is then ready to fill the spaces with color and apply the gold, enamel, or luster called for by the design. Sure, firm strokes, making corrections unnecessary, are required in applying mineral paints; for, being transparent, they do not allow the same working over that is possible with oils. One also must know which colors can be used together. A *gold color*, such

as ruby, for instance, will “eat” an *iron color*, such as carnation, if painted over it, while yellows will eat almost any color over which they are applied.

When the painting is completed, the china is sent to the kiln, for its first firing. If there is gold in the design, it will need at least one more painting and then a second firing; and, in fact, the oftener the process is repeated, the heavier and richer the gold will look. It is not always necessary to go over the painting itself the second time, although this is generally done to enrich the color. After the china has had its last firing, the gold portions are polished with what is called a *glass burnisher*, which is a brush made of spun glass; less frequently, an *agate burnisher* is used, and sometimes *burnishing sand*



A PORTABLE KILN



STILTS

What a China Kiln Is Like. There are many different makes of china kilns on the market, but in general those adapted for home or studio use are similar to the *portable kiln* here illustrated. This is made of metal lined throughout with fire brick, and burns kerosene oil. Some kilns burn gas or gasoline and others employ charcoal, but the latter must be fired out-of-doors on account of the fumes. A kiln the size of the one illustrated, which is about four and one-half feet in height, requires from one and a half to two hours to fire and consumes two gallons of oil.

The kiln is connected with the house chimney by means of an asbestos-lined stovepipe. From the tank at the side the oil is fed mechanically into the burner—the small pan shown directly below the fire box; the larger pan underneath contains sand, which absorbs any overflow. A match applied directly to a small wad of asbestos placed in the burner lights the kiln, and the heat is communicated to the lining tubes through an opening in the bottom of the fire box. Through these tubes the flames are drawn upward until they completely surround the interior of the kiln.

Regulating drafts in the burner make it possible to fire to the desired heat in any part of the kiln—a great advantage, by reason of the fact that different kinds of paints and different grades of china require varying treatment. The china is *stacked* in the kiln with due regard to these considerations. In stacking, *stills* of fire clay are placed between the pieces to keep them separate, and care is taken not to pack them too close, so that there may be sufficient room for expansion.

The Firing Process. In the door of the kiln is a mica-covered "peep-hole," permitting the firer to watch the progress of the glazing and stop the firing at the proper time. When the china takes on a translucent appearance and begins to turn an ashy-red tint, it is time to stop the flow of oil and let the kiln begin to cool. Several hours must elapse before it is opened, however, lest the current of cold air admitted cause the china to break or "crackle." The china must never be removed until it has thoroughly cooled.

CHINA SEA, the largest of the enclosed seas lying along the east coast of Asia. These seas are formed by the long chain of islands in the Pacific Ocean extending from Kamchatka to the end of the Malay Peninsula. Formosa Strait connects China Sea with the Eastern Sea on the north. The gulfs of Tonking and Siam are extensions of the China Sea on the west, and Manila Bay on the east. In the southern part it is very shallow, its average depth being less than 1,000 feet; farther north, however, it is 13,000 feet deep, off the Philippine island of Luzon. As it is situated entirely within the tropics, violent typhoons sweep

over it and make navigation very dangerous (see **TYPHOON**). The Mekong and the Menam are two large rivers emptying into it. The great ports of Canton, Hong Kong, Saigon, Bangkok, Singapore, and Manila all lie either directly on this sea or are near it. Hainan is the only important island. (See map of **ASIA**.)

CHINA'S SORROW. See **HWANG RIVER**.

CHINATOWN. See **SAN FRANCISCO, CALIF.**

CHINAWARE. See **PORCELAIN**.

CHINCH BUG, a small, blackish bug with white wings, found all over the United States and in Canada, Central America, and the West Indies. It is one of the

worst pests of corn, wheat, and other small grains. The adult insect, which is about one-sixth of an inch in length, spends the winter in old grass and rubbish. In the early spring, each female lays about 500 eggs on the roots and stems of grain, and soon the newly hatched insects, red in color, may be found in countless numbers, feeding on grains and grasses, particularly

wheat. Corn is usually attacked later in the season, after the grain is harvested. There are two generations each year, the second appearing in late July or early August. The broods keep together at first, moving on foot in great masses as the food is exhausted, and scattering when the insects reach maturity. In dry seasons they multiply at an appalling rate.

Control. Just before the bugs are ready to leave the small-grain fields for the corn fields, barriers in which they may be entrapped and destroyed should be constructed by plowing a furrow around the field and dragging a log back and forth in the furrow. The burning of waste grass and rubbish near the fields, in the fall, where the bugs are apt to hide through the winter, is also helpful. Bulletins on methods of extermination will be sent on request by the United States Department of Agriculture and by state experiment stations. W.J.S.

Classification. The chinch bug is classed as *Blissus leucopterus*, of the family *Lygaeidae*, order *Hemiptera* (which see).

CHINCHILLA, a squirrel-like animal of South America, one species of which is greatly valued for its beautiful pearly-gray fur. It is about fifteen inches long, with large ears, and a tail about one-half the length of its head and body. Chinchillas live in colonies in the high Andes of Chile, Bolivia, and Peru, make



CHINCH BUG

About nine times actual size.

numerous and very deep burrows, and feed on roots and tough vegetable growths. These



CHINCHILLA

little animals are of a gentle, sportive nature, and very cleanly; when tamed, they make interesting house pets. Chinchilla fur is used for muffs, coats, and linings (see FUR AND FUR TRADE). W.N.H.

Scientific Name. Chinchillas belong to the order of rodents and the family *Chinchillidae*. The species described above is *Chinchilla lanigera*.

CHINCHILLETTE, *chin chil et'*, a fur. See RABBIT.

CHINCHONA. See CINCHONA.

CHIN DYNASTY, a period of Chinese history that gave to China its present name. See CHINA (History).

CHINE. See PORK.

CHINESE CITY. See PEKING.

CHINESE EXCLUSION. Soon after gold was discovered in California, in 1848, Chinese laborers began to come into the territory. Their number was small, and for many years there was no opposition to them, but about 1878 the immigration of Chinese to the Pacific states increased so rapidly that the citizens of those states became alarmed and appealed to Congress to enact a law restricting their immigration into the country. In 1880 a treaty was ratified with China, giving the United States the right to restrict or suspend Chinese immigration. In 1882 an act shutting them out for ten years and prohibiting their naturalization was passed. In 1892 the Geary Act was passed. This continued the exclusion for another ten years, and compelled all Chinese in the United States to procure certificates of residence. In 1902 the law was continued and made still more comprehensive; it extended the statute to cover the country's insular possessions, and prohibited migration from one American island to another.

Objection to Chinese immigrants is largely confined to the Pacific states. The residents of those states claim that their method of living and the low wage for which the Chinese will

work are demoralizing to American workmen. There are fewer than 65,000 Chinese in continental United States.

[See ARTHUR, CHESTER ALAN (Administration) for further details of the Chinese Exclusion Act. See, also, CALIFORNIA (Oriental Immigration)]

CHINESE GORDON. See GORDON, CHARLES GEORGE.

CHINESE-JAPANESE WAR. In 1894 a rebellion broke out in Korea (see CHOSEN), which was at that time strongly under the influence of the Chinese government. Japan also had large interests in Korea, which it had gained through negotiations with China. China sent troops to Korea to quell the disturbance, and Japan sent troops to protect its interests. When the rebellion was put down, the nations could not agree upon the withdrawal of their troops. This dispute led to war, which began in July, 1894, and was ended by the Treaty of Shimonoseki, April 17, 1895. The army and navy of Japan were far superior to those of China. Several important Chinese cities were captured, and the Chinese navy was destroyed. China ceded the island of Formosa and Liaotung peninsula to Japan, and agreed to pay a war indemnity of about \$150,000,000. The European powers, however, interfered and compelled Japan to cede Liaotung back to China. This war opened the way for the Great Powers to secure important trade concessions in China, and gave Japan such a preponderant influence in Korea that in 1911 the country was annexed to Japan, and renamed Chosen.

CHINESE MALLOW. See HIBISCUS.

CHINESE TURKESTAN. See SIN-KIANG.

CHINGMA, *ching' mah*. See INDIAN MALLOW.

CHINKARA, *ching kuh' rah*. See GAZELLE.

CHINOOK', a name given by early settlers to a warm, dry wind which blows down the slopes of the Rocky Mountains in the winter and early spring. It prevails at intervals in Montana, Wyoming, Oregon, Washington, and in some of the western parts of Canada. The chinook is always a *descending* wind, and for that reason is dry, having lost its moisture on the mountain tops. In coming down the mountains, the pressure, due to the lowering altitude, squeezes out the moisture and raises the temperature at the rate of 1° F. for every 183 feet. Hence, in coming down from an altitude of 5,550 feet, the wind would be 30° warmer at the bottom than at the top. This warm, dry wind spreads out over a large surface and absorbs or melts the snow, and thus makes cattle-grazing possible all winter in these regions.

The *wet chinook*, a moist, warm wind blowing southwesterly on the Pacific coast of Oregon and Washington, is often confused with the dry chinook; but it is entirely different. It was supposed to come from the country of

the Chinook Indians, at the mouth of the Columbia River, hence the name. R.H.W.

Related Subjects. For a list of all the winds, see WIND. See, also, CANADA (Climate); MONTANA (Climate)

CHINOOK, a species of salmon (which see).

CHINOOK INDIANS. See INDIANS, AMERICAN (Most Important Tribes).

CHINQUAPIN, *ching' ka pin*. See CHESTNUT.

CHIPMUNK, a small ground squirrel, very common in Eastern North America. Its back is striped with black and white, and its tail is nearly as long as its body. This cheery, friendly little animal loves the sunshine and hot weather, and in summer is often seen on fences, hedgerows, or stumps. When the frost comes, it goes

to its tunnel-like burrow in the ground, and, living on the nuts and grains it has stored, remains hidden through the long winter. The chipmunk home consists of a chamber nearly a foot high and wide and perhaps twice as long, with several tunnels leading to the surface above. Chipmunks always take the precaution to carry the soil they remove some distance away from the openings to the burrows, leaving no tell-tale evidence of their underground abode. Chipmunks rarely eat the eggs of birds, although it is thought a common occurrence. They do, however, run off with newly planted corn, berries, apples, pears, and tomatoes. They can be tamed quite easily, and many boys imprison them in cages as pets. W.N.H.

Scientific Names. Chipmunks belong to the order of rodents, the family *Sciuridae*, and the genus *Tamias*. The species described above is *T. striatus*. Other species are found in the Central and Western United States.

CHIPPENDALE, THOMAS. See FURNITURE.

CHIPPEWA. See INDIANS, AMERICAN (Most Important Tribes, article *Ojibwa*).

CHIROMANCY, *ki' ro man sie*. See PALMISTRY.

CHIRON, *ki' ron*, in Greek mythology the famous learned centaur (half horse, half man) who taught such renowned heroes as Achilles, Hercules, Ulysses, and Aeneas. Chiron was the son of Kronos (Saturn) and Philyra, and became skilled in medicine, music, hunting, and the art of prophecy, under the instruction of Apollo and Diana. He lived at the foot of Mount Pelion, in Thessaly. One day the other centaurs were driven into Chiron's home by Hercules, and by accident a poisoned arrow

from the bow of his old pupil struck Chiron. The poison caused him such torture that Zeus mercifully ended Chiron's life on earth and placed him among the stars, where he became the constellation Sagittarius, or The Archer.

Related Subjects. See CENTAUR; also map of the heavens, in article ASTRONOMY. See, also, articles on the mythological personages, in their alphabetical positions.

CHIROPODIST, *ki rop' o dist*. See CORNS.

CHIROPRACTIC, *ki ro prak' tik*, a method of treating disease through adjustment of vertebrae by pressure exerted by the hands. The basis of the method is the theory that disease is caused by interference with the normal flow of nervous or health energy along the spinal nerves, through pressure on those nerves exerted by dislocated vertebrae. The chiropractor claims that by skillful handling he can push the displaced vertebrae into position, thus relieving the pressure and permitting the health energy to flow properly.

This method was discovered in 1895 by D. D. Palmer. A school of practice based on the method was founded by his son, B. J. Palmer.

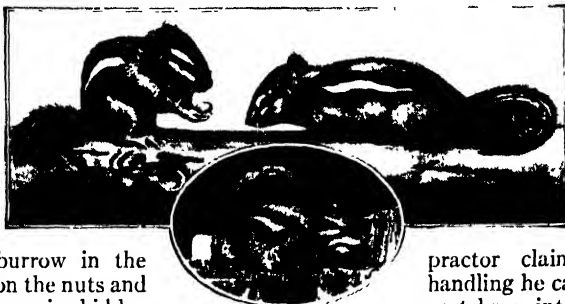
There are said to be 15,000 practitioners of the chiropractic art in the United States, besides others in fifteen foreign countries. Many chiropractic schools are in operation. W.A.E.

CHIROPTERA, *ki rop' te rah* (from the Greek for *hand* and *wing*), an order of night-flying animals—the bats—found in all parts of the world. The fingers of the fore limbs are greatly elongated, and between these and the hind limbs is stretched a thin membrane which forms the wings. The bones are slender and filled with a light marrow, and this lessens the animal's weight. In the zoological scale, this order ranks next to the Primates, to which man belongs. See BAT; VAMPIRE BAT. M.J.H.

CHISHIMA ISLANDS. See KURILE ISLANDS.

CHITON, *ki' ton*, a Greek dress. See illustration, in article DRESS.

CHITONS, *ki' tonz*, a large order of mollusks with boat-shaped shells. Gray or brown is the usual color, but in some species the shell is variegated by red, yellow, and other bright colors. The shell is composed of eight pieces, often in contact with and overlapping one another, but never truly joining. The animal clings to rocks by means of a strong, oval, muscular foot which extends the whole length of its body. It also has the power of rolling itself up by the contraction of the foot muscles, so that nothing but the shell is seen. A charac-



CHIPMUNKS



Photo. Visual Education Service

THE VIGIL OF THE KNIGHT

teristic of some chitons is the possession of thousands of tiny eyes, borne on the shell valves. Small chitons are found on the North Atlantic coast, larger ones in Florida and the Gulf of Mexico, and those eight and ten inches long—the giants—occur along the northwestern coast of the United States. See MOLLUSKS.

S.H.S.

CHIVALRY, *shiv' al rie*. In the Middle Ages, when military feudalism held sway in Europe, the sons of the nobility were educated for knighthood. The spirit and ideals of this organization of knighthood are summed up in the term *chivalry*, which to-day is associated with protection of the weak, gallantry toward women, honesty in everything.

In those "days of old, when knights were bold," as the familiar song runs, the education of the young noble began in his childhood. At the age of seven, he was sent to a court where he could be taught the use of arms, how to ride, and how to attend the ladies. When qualified for war, he became an *esquire*, or *squire*, and accompanied his lord in battle. The third and highest rank of chivalry was that of *knighthood*, which was usually not conferred before the twenty-first year. The person to be knighted prepared himself by confessing, fasting, and keeping vigil all night over his arms. Religious rites were performed, and then, after promising to be faithful, to protect ladies and orphans, never to lie nor utter slander, to live in harmony with his equals, and to protect the Church, he received the *accolade*, a slight blow on the shoulder with the flat of the sword, from the person who *dubbed* him knight.

This ceremony often took place on the eve of battle, to encourage the new knight to brave deeds, or after the combat, to reward special bravery.

As a system of education for the nobles, chivalry taught them the best ideals, social and moral, which the times could understand. The spirit of chivalry led to the Crusades, and the deeds of knights were celebrated in song by the "minstrels" in England and the "minnesingers" in Germany. See illustration, page 1405.

In Literature. We read of knightly deeds in many of Scott's novels, in Spenser's *Faerie Queene*, and in Tennyson's *Idylls of the King* and other tales of King Arthur. Cervantes' *Don Quixote*, however, is a burlesque on chivalry and its tendency to affectation and exaggerated sentimentality.

Related Subjects. The reader is referred in these volumes to the following articles:

Arthur, King	Feudal System	Minnesingers
Don Quixote	Knighthood	Minstrel

CHLORAL, *klo' rahl*, a bitter, colorless, oily liquid with an irritating smell, the hydrate of which, in the form of a white crystalline substance, is extensively used in medicine. When *hydrate of chloral* comes in contact with alkalis in the human system, it separates into chloroform and formic acid. The chloroform acts on the heart and brain, and when the hydrate is taken in prescribed doses, it produces a refreshing sleep. It has been used with success in cases of insomnia, delirium tremens, Saint Vitus's dance, lockjaw, asthma, and whooping cough. Too large doses may affect the mind seriously or cause death, and hydrate of chloral should only be used under

CHIVALRY *and* FEUDALISM



Costumes
Fourteenth and
fifteenth centuries



A knight and his castle



The ceremony of
homage. From a seal
of the twelfth century



Serf



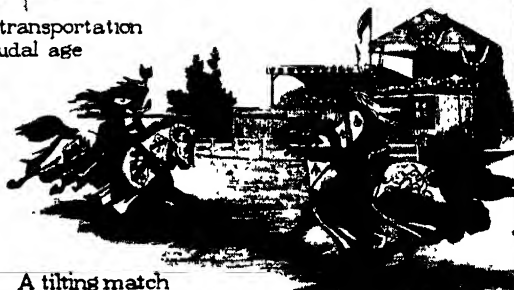
Water transportation
in the feudal age



Conferring knighthood
on the field of battle



A fully-armored horse and rider:
From a bronze statue in Madrid



A tilting match
between two knights



Instructed in the art of
war between the ages of
seven and fourteen



As a squire he attended
the knight to whom he
was attached



Knighthood was the
first of the three degrees



A full-fledged knight

DEVELOPMENT OF A KNIGHT

expert medical advice. Another argument against self-dosing is that chloral sometimes becomes a habit-forming drug. To treat poisoning by chloral, the person should be kept awake, his body warmed by friction or otherwise, hot coffee taken, and artificial breathing resorted to, if necessary. See ANTIDOTE.

Chloral is the poisonous principle in the "knock-out drops" employed by criminals to induce unconsciousness in their victims.

[Chloral hydrate is a compound of carbon, chlorine, hydrogen, and oxygen]

CHLORIDE, *klo' ride*, OF LIME. See DISINFECTANTS.

CHLORINE, *klo' rin*, a highly poisonous gas of greenish-yellow color and disagreeable, suffocating odor. It is a simple substance, or element, and has the symbol *Cl*. Chlorine belongs to the halogen (salt-producing) family of elements, those that enter into the composition of substances resembling common salt. (The other halogens are fluorine, bromine, and iodine.) When combined with the metal sodium, chlorine forms common table salt, or sodium chloride. It is manufactured on a large scale by the passage of an electric current through liquefied or dissolved salt. Chlorine combines with hydrogen to form hydrogen chloride, the solution of which is hydrochloric acid.

Pure chlorine gas turns to a liquid under pressure, and can be shipped in tanks. The liquefied product has long been a standard disinfectant for purifying city water supplies. For bleaching purposes, both liquid chlorine and chlorine combinations in powder form are found on the market. The element is widely used in industry, especially in connection with the manufacture of explosives and dye-stuffs. It is also employed in the extraction of gold from ores.

Mixed with air in proper proportions, chlorine is believed to be a remedy for diseases of the respiratory organs, and experiments are being carried on to test its value as a cure for heavy colds, bronchitis, and similar ailments. Because of its deadly poisonous properties and the ease with which the wind carries it, chlorine gas was much used by the belligerents in the World War in gas attacks. T.B.J.

Related Subjects. The reader is referred in these volumes to the following articles.

Chemistry
Halogens

Hydrogen Chloride
Poison Gas

CHLORIS, *klo' ris*, in mythology. See NIOBE.

CHLOROFORM, *klo' ro form*, a powerful anesthetic. It was discovered at about the same time (1831) by three chemists, Samuel Guthrie of America, Liebig of Germany, and Soubeiran of France, each of whom worked independently of the others. The anesthetic value of the drug was brought to the general

attention of the public in 1848 by Sir James Simpson of Edinburgh (which see).

Chloroform is a heavy, colorless liquid, with a pungent odor and a sweetish taste. It is non-inflammable and dissolves freely in alcohol and ether, but does not mix with water. Air, light, or heat causes it to decompose. Besides being used in medicine, it is employed by chemists as a solvent for fats, alkaloids, iodine, and other substances.

Inhaled in small quantities, chloroform deadens pain, and is sometimes administered in childbirth. General anesthesia for major operations requires larger quantities. The duration of unconsciousness is shorter than that produced by ether, and the after-effects are not so disagreeable, but chloroform is considered a much more dangerous drug, because it lowers the blood pressure, weakens the heart, and is harmful to the liver. It is self-evident that chloroform should never be administered except under the direction of a skilled physician. In America, ether has largely replaced it in major operations.

Chloroform is a strong irritant, and is used in liniments for chronic rheumatism and neuralgia. Small doses taken by mouth are prescribed for gastric fermentation and colic, and larger doses are given to expel worms. Physicians prescribe this drug very cautiously, however, since overdoses produce coma or death. Chloroform is also inhaled to relieve spasms in lockjaw and hydrophobia. See ETHER; ANESTHETIC; SIMPSON, SIR JAMES YOUNG.

[Chloroform is a compound of chlorine, carbon, and hydrogen. The purest form is made by decomposing chloral with an alkali]

CHLOROPHYLL, *klo' ro fil*, the green coloring matter of plants, is concerned primarily, if not entirely, with the absorption of energy from light. With this energy the manufacture of organic material (see LEAVES) proceeds in the leaf or green stem. Starch can be formed by leaves or other green parts only in the presence of light. Hence, green leaves or stems which are deprived of light will bleach or turn white to yellow, a fact applied commercially in the blanching of plants like celery. See ETIOLATION. B.M.D.

CHLOROSIS, *klo ro' sis*. See ANAEMIA.

CHOATE, *chote*, the family name of two American public men who won distinction in law and statesmanship.

Rufus Choate (1799-1850), one of the ablest lawyers America has produced and an eloquent and scholarly public speaker, was born at Ipswich, Mass. He was graduated at Dartmouth College in 1819 at the head of his class, and after studying law, was admitted to the Massachusetts bar in 1823. He served in the House of Representatives from 1830 to 1834, and in the Senate from 1841 to 1845, and in the upper house

won wide public notice because of his brilliant speeches on the tariff, the Oregon boundary, and Texas annexation. His orations and addresses are distinguished for learning, purity of style, and elegance of form.

Joseph Hodges Choate (1832-1917), the nephew of Rufus Choate, was born at Salem, Mass., and educated at Harvard College. Admitted to the New York bar in 1865, he soon became one of the best-known lawyers of New York City, and was employed in such famous cases as the income tax and the Tweed Ring suits (see **TWEED, WILLIAM MARCY**). He won greatest repute as a cross-examiner. On the organization of the Republican party, in 1854, he adopted its political principles, though he did not hold office until 1899, when President McKinley appointed him to succeed John Hay as ambassador to Great Britain. In this position he strengthened the friendly relations between the two English-speaking nations. In 1905 he returned to his practice in New York, and two years later represented the United States at the second Peace Congress at The Hague.



Photo. Brown Bros.
JOSEPH CHOATE.

CHOCOLATE, *chok' o late*, a food product widely used in cookery and in candy-making. Chocolate is made from the seed kernels of the fruit of the cacao tree, from which, also, cocoa is obtained. Chocolate differs from cocoa chiefly in having a higher percentage of fat. In the preparation of chocolate, the seed kernels, when freed from the shells, are crushed in a grinding mill, and the smooth paste which flows out is molded into cakes of the desired size and shape and allowed to harden. (For other details of the process, see **COCOA**.) According to the decisions of a committee on standards, the following descriptions of chocolate preparations are generally accepted in America:

Chocolate, plain chocolate, bitter chocolate, chocolate liquor, chocolate paste, and *bitter chocolate coating* are designations for the solid or plastic mass obtained by grinding the cacao kernels, which contain not less than fifty per cent of cacao fat, not more than eight per cent of total ash, and not more than seven per cent of crude fiber.

Sweet chocolate and *sweet chocolate coating* are designations for chocolate mixed with sugar, with or without the addition of cacao butter, spices, or other flavoring materials.

Milk chocolate and *sweet milk chocolate* are designations for the product obtained by grinding chocolate with sugar, with the solids of whole milk, or the constituents of milk solids in proportions normal for whole milk. It contains not less than twelve per cent of milk solids.

The beverage chocolate, made by dissolving chocolate in hot milk, is a wholesome, agreeable

drink, when used moderately. Unlike tea and coffee, it has valuable food properties in addition to being an excitant of the nervous system. The uses of chocolate in making confectionery, pastry, puddings, and ice cream are numerous and well known. It should be used in moderation, however, especially when it is eaten in the form of candy. Physicians say that most American people, young and old, eat far too much chocolate candy, which is injurious to the teeth, the digestion, and the nervous system, when used too freely. E.V.M'C.

CHOCTAW. See **INDIANS, AMERICAN** (Most Important Tribes).

CHOICE. See **WILL** (in psychology).

CHOKECHERRY. See **CHERRY**.

CHOKEDAMP. See **CARBONIC ACID GAS**.

CHOLERA, *kol' e ruh*, a form of diarrhoea caused by the cholera bacillus. It is infective, being spread by water, milk, raw food, by flies, and by soiled hands. The outstanding symptoms are profuse watery diarrhoea and profound shock. In times of prevalence of an epidemic, the disease can be guarded against by the exclusive use of sterilized water, cooked milk, vegetables, and other foods, exclusion of flies, and extreme cleanliness. The disease is present always in India and near-by countries. Occasionally it spreads to other countries, sometimes reaching Europe and America. Its spread is prevented by quarantines, by control of cases and carriers, and by protecting water and food supplies.

Cholera Morbus. This is acute, violent, watery diarrhoea accompanied by vomiting. There is some evidence of shock. The possibility of food poisoning, and even chemical poisoning, should be inquired into in every case of cholera morbus.

Treatment. Give no food. Give water to drink unless it provokes vomiting. Carbonated water may be acceptable to the stomach. In some cases a dose of castor oil or some similar purgative may be given as soon as the stomach will tolerate it. Morphine by hypodermic, or some cholera mixture, certain aromatics, and sedatives may be used. Aromatic spirits of ammonia and warm coffee can be given when the nausea subsides. Warm applications to the extremities and back add to comfort and overcome shock.

Cholera Infantum. This is a form of diarrhoea accompanied by great shock and rapid wasting due to great loss of water. It occurs in babies in hot weather. Cholera infantum differs only from the ordinary diarrhoea of infants in that it develops more rapidly and with evidence of shock. It is a diarrhoea with rapid loss of water from the tissues plus a heat prostration. The treatment is that of acute diarrhoea in infants, plus treatment of heat prostration and shock. Prompt medical attention is advisable. See **DIARRHOEA**. W.A.E.

CHOLERA INFANTUM. See **CHOLERA**, page 1407.

CHOLERA MORBUS. See **CHOLERA**.

CHOPIN, *sho paN'*, FRÉDÉRIC FRANÇOIS (1810-1849), a celebrated musician, one of the great masters of modern piano music. He was born near Warsaw, of French parentage on his father's side, and Polish on his mother's. In 1820, at the age of nineteen, he played some of his compositions at a public concert in Vienna, after which he traveled extensively. The political troubles of Poland drove him to Paris in 1831, where he resided for the rest of his life. Chopin's fame rests chiefly on his compositions for the piano, for he had a perfect appreciation of every effect which that instrument can produce. His mazurkas, waltzes, polonaises, preludes, études, and nocturnes are a complete revelation of his dreamy, romantic nature and of his love for new and exquisite harmonies.



Photo Brown Bros

CHOPIN

Chopin's music has an undercurrent of melancholy that suggests the unhappy lot of his native country, Poland; his celebrated *Funeral March* is one of the most effective compositions of that character ever composed. His own age recognized his greatness; Mendelssohn, born the same year as Chopin, said of one of his pieces, "It is so perfectly beautiful that I could go on forever playing it."

CHOPINES, high-heeled clogs or slippers in vogue in Europe in the seventeenth century, originating, it is believed, in Turkey. They reached England in due time, and English literature contains many references to them. Charles Reade, in *Cloister on the Hearth*, wrote, "Your wooden-heeled chopines, to raise your little, stunted limbs up." Another writer called them "high-heeled shoes particularly affected by these proude dames, or as some say, invented to keepe them at home, it being very difficult to walke with them."

CHORD, *kawrd*. See **CIRCLE**; **MUSIC**.

CHORDATA, *kawr da' tah*. See **VERTEBRATES**; **ZOOLOGY** (Divisions of the Animal World).

CHOREA, *ko re' ah*. See **SAINT VITUS'S DANCE**.

CHORLEY, HENRY FOTHERGILL (1808-1872), one of the foremost English musical critics of his day. For thirty-eight years he was associated with one London paper, *The Athenaeum*, as critic, and his opinions were widely accepted. His literary reviews showed fine insight. There was hardly a phase of the subject of music

which was not illumined by his pen. He left an unfinished autobiography.

CHOROID, *ko' royd*, **COAT**. See **EYE**.

CHOROLOQUE, *ko ro lo' kay*, a peak in Bolivia. See **BOLIVIA** (The Land and Its Rivers).

CHORON, ALEXANDER ETIENNE (1772-1834), a French writer and authority on music of the first third of the nineteenth century, who died at the age of sixty-two with the reputation of having possessed more information relating to the theory and practice of music than any other French musician. In his practical way, he reorganized the schools for training church choirs; he was a successful conductor of religious festivals, and for one year (1816) was the conductor in the great opera house in Paris.

Choron established, in 1817, the Conservatoire de Musique Classique et Religieuse (Conservatory of Classical and Religious Music), and until nearly the year of his death it exerted a powerful influence throughout cultural Europe; it raised music among the masses to a higher level.

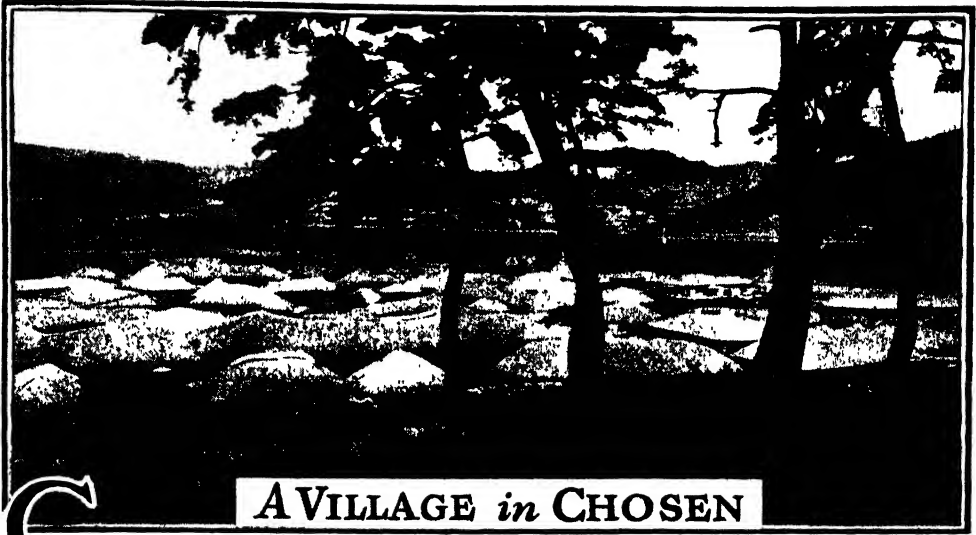
CHORUS, *ko' rus*. This term has come into our language from the Greek, but has a different meaning from that of the root word. In ancient Greek drama, the chorus was a group of singers who helped explain the action, made comments, or even took part in the dialogue. The chorus of to-day consists of a number of persons singing together in an opera, oratorio, cantata, or concert. The name is also applied to any part of a musical composition that is sung by several voices, and to that part of a song which is repeated as a refrain, at the end of each stanza. The importance of the chorus in opera and oratorio has been recognized by the greatest composers. Such compositions as *The Pilgrims' Chorus* in Wagner's *Tannhäuser*, *The Soldiers' Chorus* in Gounod's *Faust*, and *The Hallelujah Chorus* in Handel's *Messiah*, are representative of the best choral music.

In most communities to-day, choral singing is loved and appreciated. Whether it be the volunteer church choir, the high-school glee club, the choral society of a business organization, or the more formal organization of trained singers who give professional concerts, the effect of many voices singing in harmony is uplifting and refreshing.

Most choral music is written for four parts. In mixed choruses these are soprano, alto, tenor, and bass. Male choruses have first and second tenor and first and second bass parts. First and second soprano and first and second alto are written for female voices and boys' choruses. An *a capella* chorus is one that sings without instrumental accompaniment.

Related Subjects. The reader is referred in these volumes to the following articles:

Cantata	Music	Opera	Oratorio
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A VILLAGE in CHOSEN

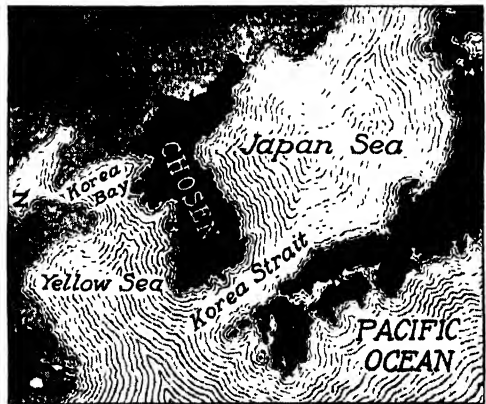
CHOSEN, formerly known as KOREA, but since 1910 a Japanese province, occupies the mountainous peninsula southeast of Manchuria, between the Japan and Yellow seas.

Having an area of about 86,000 square miles, Chosen is a little larger than the state of Utah. Wooded mountains cover the north half of the peninsula, and a high, narrow range rises precipitously from the sea along the entire length of the east coast. West of this range, the treeless, gray foothills flatten out into fertile plains, the chief agricultural section of the peninsula. The steep eastern coast is penetrated by few harbors, but the south and west coasts are fringed with bays and clusters of islands and are washed by dangerous tides. The largest island is Quelpaert, off the south coast. The most important harbors are the picturesque ports of Won-san (Korean *Gensan*), Lazareff, and Fusan (*Pusan*). The largest river is the Oryoko (*Yalu*), rising in Pei-shan, an extinct volcano, and flowing south into the Yellow Sea, forming the northwest boundary of the country. Seagoing junks ascend the stream for a distance of thirty miles, and smaller boats 145 miles farther. The Daido (*Tai-dong*), Kan (*Han*), Rakuto (*Nak-dong*), and Mok-po are other large rivers, navigable for many miles. Most of the rivers and cities have been renamed by the Japanese, but the more familiar Korean names are still commonly used. On the whole, the country lacks the dainty picturesqueness of flowered Japan and the fantastic beauty and buzzing, palpitating life of China.

The climate is pleasant nine months of the year, resembling that of the opposite coast of China. In the central and northern parts, winters are somewhat severe, and snow covers

the ground from December until February. The winters of the south are delightful, like those of Southern Japan. The temperature ranges from 5° in the winter to 90° in July. The average rainfall is thirty-six inches, most of it falling during the summer months.

The People. The natives of Chosen are a mixed race, combining the characteristics of the Chinese, Japanese, and Malayan people.



LOCATION MAP

They excel the Japanese and Chinese in stature and physique, and are more regular of feature and lighter of skin than the Mongolians. In 1925 the population numbered over 19,500,000. A small proportion were Japanese, and the Japanese are increasing in number here; there are many Chinese, and about 1,000 Americans and Europeans. The Koreans are rapidly adopting European customs of living. There are many religions among the Ko-

reans, including Confucianism, Buddhism, spiritualism, fetish, and nature worship. Ancestor worship is universal, and plays an important part in the life and morals of the natives, who are more superstitious than religious.

In no other Asiatic country has the growth of Christianity been so rapid and of such influence upon the national life. Although there were frequent persecutions before 1885, the number of converts continually increased, and in that year religious freedom was guaranteed. The Y. M. C. A., established at Keijo (Seoul) in 1907, is aided by the government.

The present government has established a school system, embracing common, industrial, and special schools, and girls are now educated equally with boys. Many of the old classical Chinese schools for boys still exist, but the system is being rapidly Westernized. There are also several hundred religious schools established by Christian missionaries.

Industry and Commerce. The soil of Chosen being fertile and its summers warm, about three-fourths of the population are engaged in agriculture. Japan, with an eye to industrial improvement, has introduced modern methods of cultivation and irrigation to supplant the primitive customs of the natives. The cultivation of ginseng has been revived and become very extensive.

Rice is still the most important crop, but barley, oats, wheat, maize, tobacco, cotton, hemp, sweet potatoes, and other vegetables are raised extensively. Mulberry trees grow in abundance, and the cultivation of the silk-worm is important. The seas teem with fish, and Japan has recently passed regulations protecting and encouraging the fishing industry; haddock, halibut, herring, sardines, and sharks are caught. Cattle-raising as an industry has been introduced, and meat, milk, butter, and cheese, heretofore little known, have become important products.

The Japanese government has also attempted to develop the mineral resources of the peninsula, the value of which is estimated at \$12,000,000 per year. The country possesses valuable deposits of gold, copper, coal, and iron. Nearly all of the important gold mines are controlled by foreigners; the United States concession, covering about 800 square miles, is the largest. The government also encourages manufacturing industries by financial assistance; the manufacture of paper, sea salt,

grasscloth, mats, bamboo screens, and pottery is important.

Korean highways are notoriously poor. Wheeled vehicles are little used, baggage being carried by porters, pack horses, and oxen, while the people travel on horseback or in sedan chairs. The Japanese government has spent \$10,000,000 for the improvement of roads in Chosen; paved streets were constructed in Keijo (Seoul) in 1915. There are three lines

of street cars in the capital. In 1924 there were 1,460 miles of railroad in the peninsula, connecting with Chinese and the Russian Siberian lines. By way of the Trans-Siberian system, it is possible to reach Moscow from Chosen in ten days, and Berlin in eleven and a half days. There is good steamer and ferry service with Japan, and fourteen treaty ports are now open for trade, which is chiefly carried on with Japan, Great Britain, China, and the United States.

Government. Chosen is controlled by a Japanese governor-general, assisted by the secretaries of the several departments and the central council, the latter consisting chiefly of Koreans. Provinces, districts, and villages are largely administered by Koreans, and financial aid and advice are furnished by the central government through Japanese clerks. Courts, prisons, customs, lands, and railroads are all controlled by the central govern-

ment at Tokyo.

History. Korea is believed to have been founded in 1122 B.C. After many centuries of independent life, it was annexed to the Chinese Empire in 108 B.C. About a century later, the peninsula was divided into three small kingdoms, the one called Kori absorbing the others in A.D. 960, and for three hundred years Kori, or Korea, existed as an independent kingdom. During this time Buddhism gained a very strong hold upon the country. A revolution in 1392 overthrew Buddhism and established the Ming dynasty. The ancient name *Chosen*, meaning *morning freshness*, was then adopted. Two centuries later, the country was invaded by the Japanese, who were finally expelled by the Chinese. For this military assistance, Korea again became tributary to China. At the close of the Chinese-Japanese War, in 1895, independence was regained, and the country was then called *Tai Han*.

The Japanese, however, gradually extended their influence over the country, contesting it with Russia. The Russians secured a large



PEASANT GIRL WITH
BABY SISTER



Photo U & U

IN THE FORMER CAPITAL CITY

Looking down on a portion of the city of Seoul, one sees a monotony of low, corrugated roofs which cover the one-story structures.

timber concession on the lower Oryoku (Yalu) River, which Japan regarded as an attempt to secure Korean territory. Japanese troops were sent to Korea, and on February 23, 1904, the emperor of Korea signed a treaty with Japan which strengthened Japanese influence and practically ended Korean independence. By the Treaty of Portsmouth, September 5, 1905, which concluded the Russo-Japanese War, Russia formally recognized Japanese predominance in Korea. A Japanese resident-general was installed, who gradually assumed the administration of the country. The murder of Prince Ito, the resident-general, hastened the final absorption of Korea into the Japanese Empire, and on August 23, 1910, the country was formally annexed to Japan. The emperor was deposed, and a governor-general from Japan was established in office. The title of the country again became Chosen.

The Cities. Aside from the former capital, there are no cities of any note in Chosen. Among the largest towns are Fusan, Taikyu-fu, and Pingyang.

Seoul, *seh ool'*, or *sah' ool*, renamed Keijo by the Japanese in 1910, was the quaint capital of Chosen for the past six hundred years. It is about nineteen miles from Chemulpo, its port on the Yellow Sea, and about

three miles north of the Han (or Kan) River. A wall eleven miles in length and pierced by eight gates surrounds this old city. Seoul is a city of strange contrasts, typical of those Oriental municipalities into which modern innovations are slowly making their way. Electric lights, an electric car line which extends to three points outside the city, a telegraph station, and a telephone system represent the newera, but the shabby, low dwelling houses of mud and stone, and the narrow, crooked streets of old Seoul are still in evidence.

A group of former royal palaces surrounded by attractive lawns and gardens, a Roman Catholic cathedral, and a temple to Confucius are the buildings of chief interest. The city is connected by railway with Chemulpo, Fusan, and Wiju. It contains a government school for English students, two hospitals operated by American missionaries, and one large Japanese hospital under government control. Two Japanese and three Chosen newspapers are published here, besides an English daily owned by the government. Population in 1925, 297,405.

Related Subjects. The following articles in these volumes will give additional information on topics connected with Chosen:

Chinese-Japanese War	Rice
Ginseng	Russo-Japanese War
Japan (History)	Yalu River

CHOW, a very handsome Chinese dog. It carries its ears erect and its bushy tail curled gracefully over its back. The hair is long and

of one color, either black, red, yellow, blue, or white. The head is broad and flat. A chow weighs from forty-five to fifty-five pounds, and is very intelligent. M.J.H.

CHOWAN, *cho wahn'*, RIVER. See NORTH CAROLINA (Rivers and Lakes).

CHOW DYNASTY, representing a period in Chinese history, famed as furnishing the first authentic date in the history of the country (August 29, 776 B.C.). See CHINA (History).

CHRIST, meaning an *anointed one*, a title of Jesus of Nazareth. See JESUS CHRIST.

CHRISTCHURCH. See NEW ZEALAND (The Cities).

CHRISTENING, *kris' en ing*. See BAPTISM, subhead.

CHRISTIAN, *kris' chan*, the name borne by several Danish monarchs, the first of whom reigned as king over united Denmark and Norway from 1448 to 1481. Of this group of sovereigns, Christian VIII, IX, and X have ruled over Denmark alone, since 1863.

Christian IX (1818-1906), who came to the throne in 1863, on the death of Frederick VII, was often called the "father of the royal families of Europe." His eldest daughter, Alexandra, became the wife of Edward VII of England; his second daughter, Dagmar, was the mother of Czar Nicholas II of Russia, his son, George, became king of Greece in 1863, after the revolution which deposed Otto II; and his grandson, the son of George, was Constantine I, until 1917 and again, 1920-1922, king of that country; Christian's grandson, Charles, was chosen king of Norway, as Haakon VII, in 1905, when Norway separated from Sweden. During the reign of Christian, Schleswig and Holstein were wrested from Denmark by Austria and Prussia (see SCHLESWIG-HOLSTEIN). In the latter part of his reign, a liberal government was established in the kingdom. He was a man of high character, winning not only the affection of his subjects but the respect of all the other rulers of Europe. On his death his son, Frederick VIII (which see), succeeded him, and ruled for six years.

Christian X (1870-), son of Frederick VIII, was crowned in May, 1912. He came to the throne with considerable experience in the affairs of government, for during his father's numerous absences he was frequently called upon to act as king. His first speech, in which he promised his people to guard their liberty and happiness, was an auspicious beginning of his reign, and he has since proved himself a capable and liberal-spirited ruler.

CHRISTIANA RIVER. See DELAWARE (The Land and Rivers).

CHRISTIAN ASSOCIATION OF WASHINGTON. See CAMPBELL, ALEXANDER.

CHRISTIAN CHURCH, one of the names applied to the Disciples of Christ (which see).

CHRISTIAN ENDEAVOR, YOUNG PEOPLE'S SOCIETY OF, an organization of the young people of evangelical Protestant churches for Christian service and the promotion of the spiritual life, founded by Rev. Francis E. Clark (which see), at Portland, Me., in 1881. The idea originated with Dr. Clark's experience

in his own Church, the Congregational, where he had successfully brought the young people together for a weekly meeting for prayer and consecration, to which literary and social work had been added. The results were so encouraging that other churches soon took it up, and the movement spread rapidly throughout the United States and Canada. Crossing the ocean, it was taken up by England and all its colonies, and by China, Japan, India, and all countries where Christian missions were established.

The society has for its motto "For Christ and the Church," and it has done splendid work in employing the activities of the young people of the churches in Christian service. The organization is interdenominational, each society being closely affiliated with its own church. The United Societies of Christian Endeavor was organized in 1885. At a later biennial convention, the name was changed to International Society of Christian Endeavor, embracing all the societies in North America. In 1905 a World's Christian Endeavor Union was formed, which holds a world's convention every four years. There are over 80,000 local chapters, with more than 4,000,000 members.

The Methodist Episcopal denomination is the only one that officially has no part in the Christian Endeavor work, as the young people's society of that church, known as the Epworth League, is a distinct organization (see EPWORTH LEAGUE). The Christian Endeavor Society is recognized by all the other branches of Methodism, and by all the other evangelical denominations in their denominational unions or departments of young people's work. Christian Endeavor societies in the Baptist Church have the same rights and privileges as the branch societies in the Baptist Young People's Union (which see). C.C.H.

CHRISTIAN ERA, the period of time beginning with the birth of Christ, extending to the present date, and to continue indefinitely. In the sixth century, a monk named Dionysius introduced the custom of reckoning the years from the birth of Christ; this method is now employed almost universally in Christian countries, although the practice did not become general until the fifteenth century. The year was often taken to begin on December 25, and for a while on various dates between December 25 and March 25. But now January 1 marks the beginning of the year in almost all countries. It is believed that Dionysius made a mistake of about four years in his reckoning, and that Christ was born about four years before the Christian Era. See CHRONOLOGY.

CHRISTANIA, *kris tyah' ne ah*, until 1925 the name of the capital city of Norway. See OSLO.

CHRISTIANITY, the religion established by Jesus Christ. The followers of Jesus were first

called *Christians*, or *followers of Christ*, at Antioch in Syria, about A.D. 65. The fundamental doctrines of Christianity are set forth in the Apostles' Creed (which see). They are as follows:

1. Belief in God as the Father.
2. Belief in Jesus Christ as the Son of God.
3. Belief that Christ arose from the dead and that He is and forever will be the Judge of both the living and the dead.
4. Belief in the Holy Spirit and the resurrection of the body.

Christianity presupposes belief in the immortality of the soul. It is considered to be of supernatural origin, a religion instituted by divine revelation. For this reason, the followers of Christianity believe it to be the only true religion, and that it is their duty to persuade all men to accept it. This belief lies at the foundation of the missionary movement of the Christian Church.

Christianity had its birth in old Palestine, whence it spread to Asia Minor, Southern Europe, and the countries in Northern Africa. It is the accepted religion of most of the countries of Europe except Russia, of all the countries of North and South America, Australia, and the Union of South Africa. There is not a country in which Christianity is not known, and Christian missionaries have established stations among practically all people outside of Christian nations. Its followers outnumber those of any other religion.

Related Subjects. For a detailed list of topics connected with Christianity, see the *Related Subjects* division at the end of the article RELIGION.

CHRISTIANS, defined. See CHRISTIANITY.

CHRISTIAN SCIENCE, the religion founded by Mary Baker Eddy and represented by the Church of Christ, Scientist, including the First Church of Christ, Scientist, in Boston, Massachusetts, and the branches of this "Mother Church" in all countries.

In her book entitled *Retrospection and Introspection*, Mrs. Eddy related the origin of Christian Science as follows:

During twenty years prior to my discovery, I had been trying to trace all physical effects to a mental cause, and in the latter part of 1866 I gained the scientific certainty that all causation was Mind, and every effect a mental phenomenon. My immediate recovery from the effects of an injury caused by an accident, an injury that neither medicine nor surgery could reach, was the falling apple that led me to the discovery how to be well myself, and how to make others so.

The teachings of Christian Science are briefly but completely stated in Mrs. Eddy's principal book, *Science and Health, with Key to the Scriptures*. Known as the Christian Science textbook, this work is adapted for inquirers as well as students, and is read in connection with the Bible in the Sunday serv-

ices and Wednesday evening meetings of this denomination. All of Mrs. Eddy's writings are to be found in many public libraries, and in the public reading rooms which are maintained by all Christian Science churches.

The Church of Christ, Scientist, founded in 1879 and reorganized in 1892, is designed "to commemorate the word and works of our Master" and to "reinstate primitive Christianity and its lost element of healing." Healing, in the broadest sense of this term, is regarded as the purpose of the Church, while healing the sick by mental and spiritual practice is emphasized as an essential aspect of Christian Science. The growth of the Christian Science denomination has resulted largely therefrom.

The distinctive feature of Christian Science theology is its teaching that "all reality is in God and His Creation, harmonious and eternal. That which He creates is good, and He makes all that is made. Therefore, the only reality of sin, sickness, or death is the fact that unrealities seem real to human, erring belief, until God strips off their disguise." They are not true, in the belief of Christian Scientists, because they are not of God. Christian Scientists believe "all inharmonious of mortal mind or body is illusion, possessing neither reality nor identity, though seeming to be real and identical." The practice of Christian Science follows the proposition that "there is a law of God applicable to healing, and it is a spiritual law instead of material."

The Christian Science denomination has its headquarters in Boston, where its Publishing Society issues the *Christian Science Journal* (a monthly, published in English and containing directories of churches and practitioners), the *Christian Science Sentinel* (a weekly, in English), *Der Herold der Christian Science* (monthly, in English and German), *Le Herald de Christian Science* (a monthly, in English and French), the *Christian Science Quarterly Bible Lessons* (containing the Lesson-Sermons for Christian Science services and study, and published in many languages), and the *Christian Science Monitor* (an international daily newspaper).

There are about 2,000 churches of this denomination in the United States, and more than 350 in other countries, of which the majority are in Canada, England, and Germany.

C.P.S.

Mary Baker Eddy (1821-1910), the discoverer of Christian Science and the founder of the Christian Science Church. She was born at Bow, near Concord, N. H., and was educated in the public schools, at Sanbornton (N. H.) Academy, and by private teachers. She was of a religious nature, and at an early age was admitted to membership in the Congregational Church, in spite of her inability to subscribe to some of its doctrines. This membership was retained until she founded her own Church.



Christian Science Mother Church. The great mother church is centered in the picture. At the right, the original church; at the left, the publications' office. The portrait is that of Mrs. Eddy, the founder.

In 1843 she married George W. Glover, who took her to Charleston, S. C. He died about a year later, and she returned to the home of her parents practically without means; as a matter of conviction, she had liberated the slaves her husband had held. Here a son, George W. Glover, was born. As she was in very delicate health and dependent upon her family, her position was difficult. She was always a devout student of the Bible, and in her distress of body and mind she constantly turned to it for relief and guidance, and in 1866, while suffering from a serious accident, she gained the perception of the meaning of the Scriptures which brought about her own healing and gave rise to the religion she founded. Of this experience she afterward published an account, which is found in her work, *Miscellaneous Writings*.

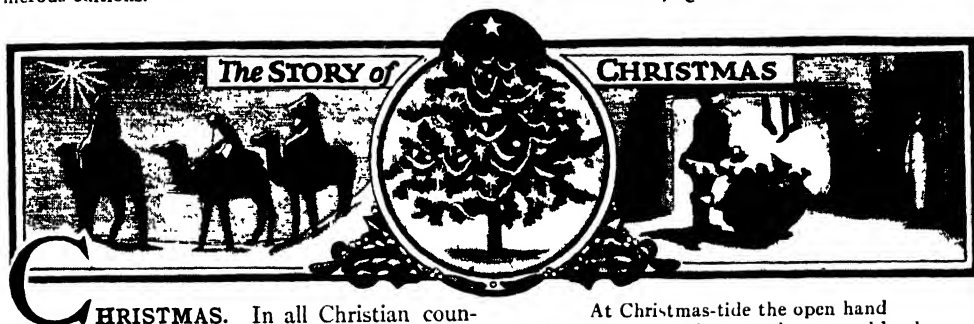
After nearly a decade of work in pondering her discovery, perfecting its statement, and proving its worth to her fullest satisfaction, she produced in 1875 her fundamental contribution to the religious and therapeutic thought of the world in *Science and Health, with Key to the Scriptures*, which is the "text-book" of Christian Science. It has gone through numerous editions.

In 1877 she married Dr. Asa G. Eddy, who was associated with her in the Christian Science movement. In 1879 she organized the Church of Christ, Scientist, which in 1892 was reorganized as The First Church of Christ, Scientist, in Boston, Mass. Of The First Church, known also as The Mother Church, she was pastor for many years. (Illustration on opposite page.)

In 1881 she opened in Boston the Massachusetts Metaphysical College, the only institution of its kind having a charter from the Commonwealth. For a number of years, Mrs. Eddy lived in comparative retirement at Concord, N. H. In 1908 she went to a suburb of Boston, where, revered by her followers, she remained in charge of her large and growing movement almost to the day of her death, December 3, 1910.

Her Books. In addition to *Science and Health* and *Miscellaneous Writings*, referred to above, Mrs. Eddy wrote a *Church Manual*, *Unity of Good and Other Writings*, and *Christian Healing and Other Writings*, and numerous pamphlets.

CHRISTINA, QUEEN. See SWEDEN.



CHRISTMAS. In all Christian countries, Christmas is celebrated as the anniversary of the birth of Christ, "the Prince of Peace," "the King of Kings." That day, by common consent December 25, is marked by special religious services in various churches, by charitable deeds, the exchange of gifts, and by merrymaking and rejoicing. It is on that day, as Longfellow wrote, that we hear Christmas bells—

Their old familiar carols play,
And wild and sweet
The words repeat
Of peace on earth, good-will to men!

The time when the Christmas festival was first observed is not definitely known. It is spoken of in the beginning of the third century by Clement of Alexandria, and Chrysostom speaks of it in the latter part of the fourth century as a custom of long standing. Other dates were often celebrated as the day of the Nativity, but finally, December 25 was universally adopted; there is no evidence that the date is absolutely correct. But exactness on those points is now not so important as the "spirit of Christmas," the spirit of giving, of helping—a broad, all-embracing love for our fellow men. Margaret E. Sangster in the poem *Christmas-tide* puts the sentiment in verse:

At Christmas-tide the open hand
Scatters its bounty o'er sea and land,
And none are left to grieve alone,
For love is heaven and claims its own.

The giving of presents and the use of holly, mistletoe, Yule logs (see YULE), and the was-sail bowl have all descended from the days of paganism, but they are things which set the day distinctly apart from all other holidays. Without the Christmas tree and Santa Claus for the little folks, the day would be incomplete and lose much of its deeper meaning to families. The custom of sending greetings on "Christmas cards" started more than fifty years ago.

In recent years, many cities have adopted the beautiful custom of celebrating the festival as communities. Great Christmas trees, glowing with innumerable lights, are set up in a central location, such as Madison Square, in New York, or the lake front in Chicago, and on Christmas Eve the people gather about these trees to sing the familiar hymns and carols associated with the birth of Christ.

Origin of the Christmas Tree. Use of the fir tree in connection with Christmas celebrations is of Germanic or Scandinavian origin. When the pagans of northern Europe became Christians, they made their sacred evergreen trees a part of the Christian festival, and decorated

CHRISTMAS PROGRAMS

Be merry all, be merry all,
With holly dress the festive hall;
Prepare the song, the feast, the ball,
To welcome merry Christmas.

—SPENCER.

Song, *God Rest Ye Merry, Gentlemen* Old Carol
The First Christmas Luke 11, 8-21
The Birds of Bethlehem Gilder
Christmas Proctor
The Fir Tree (adapted) Andersen
Song, *O Little Town of Bethlehem* Brooks
Jest 'Fore Christmas Field
Little Gottlieb Cary
Scenes from A Christmas Carol Dickens
Christmas at the Cratchits'
Christmas at Scrooge's Nephew's
Christmas in Old Time Scott
The Little Christmas Tree Coolidge
Essay, *How the Fir Tree Became the Christmas Tree*
Christmas Everywhere To-night Brooks
While Shepherds Watched Their Flocks Deland
Song, *It Came upon the Midnight Clear*

Good Morning Santa Claus

For little children everywhere
A joyous season still we'll make;
And bring our precious gifts to them,
Even for the dear child Jesus' sake.

—CARY.

Song, *Silent Night, Holy Night*
Christmas Bells Longfellow
A Visit from Santa Claus Moore
Essay, *Why the Evergreens Keep Their Leaves in Winter*
Old Christmas Howitt
Christmas Snow Spofford
Scene from *Cricket on the Hearth* Dickens
The Party at Caleb's
Song, *While Shepherds Watched Their Flocks by Night*
Why the Chimes Rang Alden
Christmas Song Field
Kris Kringle Aldrich
The Little Match Girl Andersen
Kris Kringle's Travels Best
What Child Is This? Old Carol
Carol's Dinner Party, from The Birds'
Christmas Carol Riggs
Song, *Away in a Manger* Luther

the trees with gilt nuts and apples in imitation of the stars.

One legend relates how on a Christmas Eve, twelve centuries ago, the first Christmas tree was miraculously revealed. Winfred, an Englishman who had gone to Germany to spread the teachings of Jesus, found a group of worshippers gathered at the Oak of Geismar about to sacrifice little Prince Asulf to the god Thor. Winfred averted the death blow and cut down the "blood" oak. As it fell, a young fir tree appeared, which the missionary declared was the tree of life or Christ, of whose birth he then told the people.

Many fine stories have been woven about the Christmas spirit and Christmas merry-making. Dickens' *Christmas Carol*, the story of Scrooge and "Marley's Ghost," is one widely read and loved. See *CAROL*, for one of the most famous Christmas carols ever written.

A Christmas Carol, one of the most beautiful and inspiring of all Christmas stories. It was written by Charles Dickens, and published in 1843, and the 15,000 copies that were speedily sold brought the author about \$3,500. *A Christmas Carol* is the story of a "clutching, covetous old sinner" by the name of Scrooge. How the Ghosts of the Christmas Past, Present, and Future brought about his regeneration is told in a series of pictures that have all the humor, the pathos, and the realism that are a part of the author's genius. Tiny Tim, the crippled child of Scrooge's brow-beaten clerk, is one of Dickens' well-loved creations. The story is one that children and their elders read and re-read with equal delight. Thackeray called it a national benefit, and declared no better charity sermon had ever been preached.

CHRISTMAS ISLAND. See *SINGAPORE*.

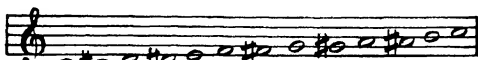
CHRIST OF THE ANDES, a remarkable statue. See *ARGENTINA*.

CHRISTOPHER NORTH. See *WILSON, JOHN*.

CHRISTY, *kris'tie*, HOWARD CHANDLER (1873-), an American painter and illustrator with a dashing but not exaggerated style, creator of a picturesque and romantic type of society woman. He was born in Morgan County, Ohio, and studied at the National Academy and the Art Students' League in New York. During the Spanish-American War he went to Cuba with Roosevelt's "Rough Riders," and the illustrations he made there, which were published in *Scribner's* and *Harpers's* magazines and in *Collier's Weekly*, aroused the first interest in his work. A portrait of Colonel Roosevelt gained him special prominence later, and he also produced portraits of numerous prominent men, among them that of President Harding, for the steamship *Leviathan*. However, he is best known through his black-and-white illustrations of serial stories in magazines and for his illustration of several of James Whitcomb Riley's books. Christy pictures are favorites as colored prints on magazine covers.

CHROMATIC ABERRATION, *kro mat' ik ab ur a' shun*. See *ABERRATION*, subhead.

CHROMATIC SCALE, in music, the scale produced by dividing the whole tones of the natural, or diatonic, scale into half-tones.



CHROMATIC SCALE

The chromatic half-tone, or semitone, is the interval between a note and that note raised by a sharp or lowered by a flat. The chromatic scale, with the two half-tones already in the diatonic scale, is an octave divided into twelve semitones. Composers make use of the chromatic tones to produce many beautiful effects in music. See *MUSIC*; *SCALE*.

CHROMATIN, *kro' ma tin*. See *HEREDITY*; *CELL*.

CHROME, *krome*, a name applied to a number of substances used as the basis of paints. *Chrome yellow* is a compound of chromic acid and lead. *Chrome green*, a compound of chromium and oxygen, is used by calico printers and for enamels; it is also the basis of a number of green paints and dyes which are not poisonous. *Chrome red* is a compound of chromium and lead. All chrome colors are noted for their clearness and brilliancy.

CHROME YELLOW. See *LEAD*.

CHROMIC, *kro' mik*, **IRON ORE.** See *CHROMITE*.

CHROMITE, *kro' mite*, OR **CHROMIC IRON ORE**, a mineral, the chief ore from which chromium is extracted (see *CHROMIUM*). It is of black or brownish-black color, with a sub-metallic luster, and resembles magnetite or magnetic iron ore in appearance. It is usually associated with serpentine. Chromite is largely used in the preparation of paints, in calico-printing, or the dyeing of cotton goods, and in the preparation of chromium and its compounds. It is found in New Caledonia, Greece, Great Britain, Asiatic Turkey, Japan, Canada, and Cuba. Small quantities are mined in California. A.N.W.

Chemical Formula. The formula for chromite is FeCr_2O_4 , that is, a molecule contains one atom of iron, two atoms of chromium, and four atoms of oxygen.

CHROMIUM, *kro' mi um*, a very hard steel-gray metal, obtained chiefly from the ore chromite (which see). Chromium is not used in pure form, but is one of the most valuable of plating materials because of its hardness, resistance to high temperatures, and imperviousness to most acids and to salt spray. It can be plated on iron, steel, copper, brass, and other metals, and the resulting product is reckoned the hardest substance known, next to the diamond. Any metal coated with chromium

will scratch glass and the hardest steel plate. Because automobile radiators, lamps, pistons, valves, shafts, and bearings plated with chromium are indefinitely protected from rust, tarnish, and wear, chromium is used extensively in the automobile industry. The United States government uses chromium-plated steel engravings for printing money and postage stamps, and in the textile industry steel plated with chromium is coming into use in the printing of delicate fabrics.

There are various steel alloys containing chromium (see ALLOY). Chromium steel is especially serviceable in the manufacture of airplane engines, safes, armor plate, and high-speed tools. A stainless steel valued as a material for knife blades, which is resistant to acids found in foods, is produced by alloying steel with about fifteen per cent of chromium; rust-proof iron contains the same amount.

The compounds of the metal are utilized in the arts and industry. Chrome yellow, a compound of chromium and lead, is an important basis of yellow paint. Chrome green, or ultramarine, a compound of the metal and oxygen, is used for painting china and coloring bank notes. Potassium bichromate is employed in dyeing, in photography, and in the production of various pigments. The symbol for chromium is *Cr.* (see CHEMISTRY). T.B.J.

CHROMOSOME, *kro' mo sohm*. See EVOLUTION (The Factors of Evolution); BOTANY (Contribution to Human Welfare); CELL; HEREDITY.

CHROMOSPHERE, *kro' mo sfeer*. See SUN (The Sun's Surface).

CHRONICLES, *kron' i k'lz*, BOOKS OF, two books of the Old Testament which follow the books of *Kings*. The name in Hebrew means *Acts of the Days*. In the Hebrew Scriptures, *Chronicles* consists of only one book. The division was made when the Septuagint (which see) was written. *Chronicles* differs from *Kings* in giving more fully the religious side of the history of Israel during the period covered, and in giving the history of the kingdom of Judah to the exclusion of that of Israel after the kingdoms were divided. It is thought that these books were written by the priests.

CHRONOLOGY, *kro nol' o jie*, the science of dividing time into periods and of giving to historic events their proper dates. The unit of time in chronology is the year. When the date of an event is given, we mean that such an event happened so many years after or before some great point in history, which is regarded as the beginning of an *era*.

We say that Columbus discovered America in A.D. 1492, meaning that he made his great discovery 1,492 years after the birth of Christ; A.D. is the abbreviation for the Latin expression *Anno Domini*, meaning in the year of Our Lord, and the birth of Christ is the beginning of

the *Christian Era*. Dates of events occurring before the birth of Christ are written with the letters B.C.; as, Julius Caesar invaded Britain in 55 B.C. This system of fixing dates is the one now commonly employed throughout the enlightened parts of the world.

The Greeks reckoned time by the four-year intervals between the Olympic Games, which were known as *Olympiads*. They began their era from a date which corresponds to 776 B.C. The Roman era begins with the founding of the city of Rome, 753 B.C. being the date generally accepted. Another important era is the Mohammedan, dating from the Hegira, Mohammed's flight from Mecca, in A.D. 622. The American and European year 1935 is therefore the Mohammedan year 1313.

Related Subjects. The reader is referred in these volumes to the following articles:

Calendar (Hebrew Calendar)	Hegira
Christian Era	Year

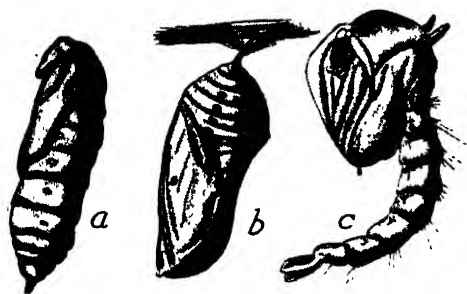
CHRONOMETER, *kro nom' e tur*, in a general sense, is any instrument that measures and records time. Thus, a clock, a watch, a sundial, or any other device that does this is a chronometer. In a specific sense, a chronometer is an instrument made for very accurate and minute measurements of time. The one most widely known is the *marine chronometer*, which determines time in connection with finding longitude at sea. For this purpose, it is set at the time of some first, or prime, meridian. Greenwich time is used by American and British ships; that of Paris, by the French; and that of Berlin, by the Germans. The mechanism of these instruments is very delicate and easily affected by outside influences; they must be kept away from the magnetic influence of compasses and from the vibrations of the ship. These chronometers are hung in their cases on gimbals, so they may always be in a horizontal position. A pocket chronometer, which is used for railroad and racing purposes, looks like an ordinary watch, but is somewhat larger. It registers very small fractions of time. See WATCH.

CHRONOS, *kro' nohs*, in mythology, the father of Hades (which see).

CHRYSLID, *kris' a lid*, a term having the same meaning as chrysalis (which see). See, also, INSECT (The Developing Insect).

CHRYSLIS, *kris' a lis*, the resting state of a butterfly, when it has ceased to be a caterpillar but has not yet developed into a flying insect. The caterpillar is the *larva* of the butterfly; the chrysalis is the *pupa*. When the larva attains full growth, it encases itself in a hard, smooth skin, becoming a chrysalis (or chrysalid). In this form it remains attached to a plant or other object by a silken button at the end of the abdomen, or by a loop of silk passed around the middle of the body. The butterfly pupa looks like a wingless, legless,

lifeless object, but during this stage, antennae, wings, and legs develop beneath the skin of the pupa, and at the proper time the hard



CHRYALIDS AND COCOONS

(a) Cocoon of sphinx moth. (b) chrysalis of monarch butterfly; (c) pupa of mosquito. The term chrysalis is usually limited to the pupa of a butterfly.

covering breaks open, and the perfect insect emerges. The pupal stage of most moths is passed in a silken case called a *cocoon*. W.J.S.

Derivation. *Chrysalis* is derived from the Greek word for *gold*. The name was given because some of the chrysalids shine with a golden luster.

Related Subjects. The reader is referred in these volumes to the following articles

Butterfly	Larva
Caterpillar	Metamorphosis
Cocoon	Moth
Insect	Pupa

CHRYSANTHEMUM, *kris an' the mum*. The story of this stately, free-blooming autumn flower, the national flower and imperial emblem



CHRYSANTHEMUM

of Japan, is most interesting. In its natural state, it is much like the aster—coarse-leaved, with rather common-looking flowers, the ox-

eye daisy and the corn marigold being two species. But as a result of care, cultivation, hybridization, and selection, the chrysanthemums of the gardens and hothouses to-day are gorgeous offspring of Chinese and Japanese varieties, with leaves pale green or dusty silver, and large, globelike, ragged-blossomed flowers of many forms and colors. Every year when the gray days come and other flowers have faded, in garden spots or florists' windows or under the glass of greenhouses, the chrysanthemum, the "golden flower," affords a wealth of brilliant hues.

In the Imperial Gardens of Japan originated the custom of "chrysanthemum shows." Now each year in many countries, for several weeks at a time, rich and poor alike can feast on the sight of chrysanthemums—white or yellow, pink or purplish-rose and red, quilled or twisted, solid or shaggy, single, double, or semi-double—chrysanthemums in true pompon or button form and size, dozens of blossoms from one stem, or one wonderful, showy, eight-inch head topping one straight, sturdy stem. B.M.D.

Feast of Chrysanthemums, a festival celebrated by the Japanese in October, marked by magnificent displays of the Japanese imperial emblem. The feast is called *kiku-no-sekku*, and has practically become a public holiday, with streets filled with gay crowds on their way to the flower shows. The blessing of longevity is supposed to be conferred on this day by sprinkling chrysanthemum leaves over tables laid for tea.

Classification. The chrysanthemums constitute the genus *Chrysanthemum* in the family *Compositae* (see COMPOSITE FAMILY)

CHRYSOSTOM, *kris' os tum*, JOHN, Saint (about 345-407), one of the most beloved and celebrated of the early Church fathers, born at Antioch, Syria. He studied rhetoric with the famous orator Libanius, and earned the name Chrysostom, meaning the golden-mouthed. Through the influence of his pious mother he determined to consecrate his life to God in the deserts of Syria, but after six years he became ill and returned to Antioch. He was later ordained deacon and presbyter, and in 398 went to Constantinople, where he was called *John the Almoner*, due to his zeal for charity. He preached so much against worldliness that the emperor banished him to the northeast shore of the Black Sea. Obligated to make most of the journey on foot, bare-headed, in the burning sun, he died on the way. His festival is observed on January 27 in Roman churches.

[The *Homilies* he wrote on parts of the Scripture are the best in the ancient Christian literature.]

CHUB. See FISH.

CHUCK WILL'S WIDOW. See WHIP-POOR-WILL.

CHUGACH NATIONAL FOREST. See ALASKA (Animal and Plant Life).

CHURCH. When Jesus Christ was on earth, He gathered about Him a body of followers who accepted His teachings and spread them after the Resurrection. Within a few years, this organization became known as the *Church*. The name comes from a Greek word meaning *dedicated to the Lord*. The Scotch *kirk* and the German *Kirche* come from the same word and possess the same meaning. In the Book of *Revelation* (which see) the Church is spoken of as the bride of Christ, meaning all who have become His followers. This makes the Church a spiritual body, and this is what the word means in its broadest sense.

During the time of the Apostles, the name was applied to different groups of Christians, and some of Saint Paul's Epistles are addressed to these churches. In *Revelation*, also, the word is used in the same way, where the angel bids John write to the seven churches in Asia Minor. A third meaning of the word is a body of Christians having the same creed, as the Presbyterian Church, the Baptist Church, the Roman Catholic Church. In this sense the meaning is the same as *denomination*.

Finally, the name, as a common noun, is given to the building in which a group of people of the same faith worship.

Related Subjects. For the history of the Christian Church down to the end of the Reformation, see the articles ROMAN CATHOLIC CHURCH, REFORMATION, THE. After the Reformation, the Protestant body divided into numerous branches, because of differences in regard to doctrine and worship. The important divisions of the Protestant group are treated in this work under their respective titles.

CHURCHES OF GOD IN CHRIST AND JESUS. See ADVENTISTS.

CHURCHILL, LADY. See ANNE (Queen of England).

CHURCHILL, WINSTON (1871-), an American author who has written a series of historical novels and several noteworthy books dealing with live social and political issues in modern American life. He was born in Saint Louis, Mo., and was graduated in 1894 from the Annapolis Naval Academy. Churchill's novel, *The Celebrity*, appeared in 1898, the first of about a dozen successful stories. His literary career he varied by taking an active part in the politics of his home state, New Hampshire. In 1903 and 1905 he was elected to the state legislature, and in



Photo Brown Bros

WINSTON CHURCHILL
American author.

1912 was the unsuccessful candidate of the Progressive party for governor.

His Writings. *The Celebrity* was followed by three related historical novels that became very popular—*Richard Carvel*, *The Crisis*, and *The Crossing*, tales of colonial and pioneer days. In 1906 came possibly the author's best achievement, *Coniston*, a finely written story of New England local politics. This was followed by *Mr. Crewe's Career*, another political novel, *A Modern Chronicle*, *The Inside of the Cup*, *A Far Country*, *The Dwelling Place of Light*, *The Traveller in War-Time*, and *Dr. Jonathan* (a play). Churchill's books are brightened by delightful humor, and he knows how to arouse and hold the reader's interest. All of his novels show the results of sound, careful workmanship, and are uniformly clean and wholesome.

CHURCHILL, WINSTON LEONARD SPENCER (1874-), one of the best-known of the

modern group of English statesmen, who, though he began his Parliamentary career as a Conservative, rose to distinction in the House of Commons as a Liberal. He entered the army in 1895, saw service in India and in Egypt, winning a medal for gallant conduct in the Battle of Khartum, and during the South African War was correspondent for a London paper. Elected to Parliament in 1900, he allied himself with the Liberals, and in 1906, during the Campbell-Bannerman Ministry, became Parliamentary Secretary for the Colonies. From 1908 to 1910 he was President of the Board of Trade, in 1910 became Home Secretary, and in 1911 was appointed First Lord of the Admiralty in the Asquith Ministry, being one of the youngest men who ever held this office.

Though Churchill was an advocate of a strong navy, in 1913 he suggested to Germany the plan of a "naval holiday," each nation to cease adding to its navy for one year. The next year saw nearly all Europe involved in the greatest conflict of modern times, the World War. Churchill's conduct of naval affairs in the war, especially in connection with the campaign in the Dardanelles, caused much dissatisfaction, and when the Cabinet was reorganized in 1915 he was relieved of the Navy portfolio. But that his ability might not be lost to the Cabinet, he was appointed to the office of Chancellor of the Duchy of Lancaster. In November of the same year, he resigned and joined the army in France, but retained his seat in Parliament. In 1918 he became Secretary of State for



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WINSTON CHURCHILL
English author, soldier, and statesman.

War and Air, and in 1921 Secretary of State for the Colonies. With the downfall of his party he was for a brief time in retirement, but in 1924 he was returned to the Parliament and became Chancellor of the Exchequer in the Baldwin Cabinet. See GREAT BRITAIN (History); BALDWIN, STANLEY.

CHURCHILL RIVER, in Western Canada, with the exception of the Nelson and its tributaries, the greatest of the rivers which flow eastward into Hudson Bay. It is nearly 1,000 miles long, and its drainage basin, which is not sharply defined, includes about 115,000 square miles. One of its northern branches rises in Lake La Loche, in Saskatchewan, about ten miles from the Alberta boundary. About 300 miles eastward on its course it receives Reindeer River, which gives the Churchill a direct connection with the Mackenzie system, the greatest river system in the Dominion of Canada.

Throughout its course the Churchill flows through many large and small lakes; in fact, it may be called a chain of lakes connected by narrow, rapid channels. For the most part the lakes and rivers are navigable for canoes, but there are many places where rapids and waterfalls make short portages necessary. In the early days of the Northwest, long before the coming of a railway, the Churchill was an important trade route. Along its banks fur-bearing animals are still trapped in large numbers, and its waters abound in fish. Fort Churchill, at the mouth of the river, is the best natural harbor on Hudson Bay. The river was named for John Churchill, first Duke of Marlborough, who was the third governor of the Hudson's Bay Company (see MARLBOROUGH, JOHN CHURCHILL).

CHURCH OF CHRIST, SCIENTIST. See CHRISTIAN SCIENCE.

CHURCH OF ENGLAND, the Church established by law as the national church of the English people. Saint Chrysostom and Jerome are the first to mention anything about the early British church, three bishops of which attended the Council of Arles, 314 A.D., over 200 years before the coming of Augustine (A.D. 596). From this on until the reign of Henry VIII, the spiritual guidance of the Pope was universally acknowledged. Henry took advantage of his quarrel with the Pope to withdraw any allegiance formerly given, announcing that the king of England always had been the head of the church in England. Parliament in 1534 sustained the king and made the Church in England independent of the Pope, restoring it to its ancient position. See HENRY (VIII, England) and Related Subjects there given.

A few years before this, Martin Luther, in Germany, had started the revolt against the Roman Catholic Church known as the Reformation, and his ideas had begun to find favor

with a large number of the English people. Protestantism, however, with a meaning somewhat different from that given it in America, was not established in England without a severe struggle that lasted through the reigns of Edward VI, Mary, and Elizabeth. In the Elizabethan period, the English Church was definitely committed to an independent existence, and the Thirty-nine Articles of Religion were put in their present form. See THIRTY-NINE ARTICLES.

The Church of England claims to teach and uphold the doctrines of the Apostles, and to be a branch of the one universal Church of Christ. Its doctrines are stated in the Thirty-nine Articles, the Book of Common Prayer, and the books of homilies. The Church has possession of the edifices, lands, and other property granted it in former times, and is protected by law in the possession of these endowments. In civil matters it is under the jurisdiction of Parliament. Convocations of the clergy are called for the discussion of religious matters, and these often exercise considerable influence. A wide range of belief in matters of doctrine and forms of worship prevails at the present time in the Church, which is divided into three groups—the High Church, Low Church, and Broad Church parties. The first group represents those who are nearest the Roman Catholic Church in doctrine and ritual; the second group, those who favor greater simplicity and are, in general, opposed to that which savors of the Roman worship; the third comprises the large group that is between the two extremes.

The Anglo-Catholics, as the High Church adherents are usually known, have long tried to restore the ancient ritual, which in part is like that of the Roman Church. A bill to endorse a revised Book of Common Prayer, designed to meet some of their aspirations, was introduced into Parliament in 1927. It was accepted by the Lords, but was rejected in the House of Commons, in December of that year. A second measure, offering a compromise, was rejected in June, 1928, and the following October a synod of bishops was called in London to consider the matter. This body decided to accept the decision of the House of Commons as final. A year later, however, the convocations of York and Canterbury voted to authorize the use of the Prayer Book as revised, but made its use optional with any bishop, not compulsory.

In regard to organization, the country is divided into two provinces, Canterbury and York. These are governed by archbishops, the archbishop of Canterbury having jurisdiction over England as a whole. The provinces are divided into dioceses, over which are bishops. Next to the bishops, in order of rank, are the archdeacons and deacons, followed by canons,

prebendaries, rectors, vicars, and curates. The English clergy are supported neither by the State nor entirely by voluntary contributions of the Church members, but chiefly by endowments and bequests given by persons of means and liberality. The Church is exceedingly active in both foreign and home missionary work.

The American Protestant Episcopal Church was once a branch of the Church of England. The High Church party has made several ineffectual attempts to rename it the American Catholic Church.

Related Subjects. A broader understanding of the history of the Church of England will result from reading the following articles

Archbishop	Luther, Martin
Augustine, Saint	Oxford Movement
Canterbury	Reformation
Catharine of Aragon	Thirty-nine Articles
Episcopal Church	York

CHURCH OF GOD, ADVENTIST. See ADVENTISTS.

CHURCH OF JESUS CHRIST OF LATTER DAY SAINTS. See MORMONS.

CHURCH OF SAINT SOPHIA. See CONSTANTINOPLE.

CHURCH OF THE HOLY SEPULCHER. See JERUSALEM.

CHURN, a closed vessel in which butter is made. Whatever the type, every churn is based on the principle that rapid stirring of milk or cream causes the fat particles to separate from the liquid and gather into lumps. The earliest churns of which we have any record were made of goat skins, used with the hair side out. In these, milk was agitated by swinging or beating until the butter was produced. In many farm homes, the old-fashioned vertical-dasher churn is still used. It is a wooden cylinder tapering to the top, where it is fitted with a cover. Through the cover passes a handle, to which is attached a wooden dasher. This consists of two pieces of wood crossing each other and perforated with a number of small holes. In another common type of hand churn, the dasher is revolved in the receptacle.

Barrel churns are also in common use. These are operated by a crank that gives the churn itself a rotary motion, end over end. No dasher is needed. The butter is thrown upon the sides of the barrel, and the churner may watch the process through a small glass window in the cover. In still another kind of churn, the liquid is agitated by a back-and-forth motion of the vessel, which swings from side to side like a cradle. Churns should be made of hard, well-seasoned wood, as soft wood tends to give the butter a disagreeable taste.

In creameries, where factory equipment takes the place of hand churns, power-driven machines are used, in which the butter is worked after the buttermilk is drawn off.

Some of these machines have the butter-working apparatus a part of the mechanism, and in others it is adjusted separately, after the removal of the buttermilk. Combination churns and cream separators are also employed in some creameries. F.W.D.

[See illustrations, in article BUTTER.]

Related Subjects. The reader is referred in these volumes to the following articles

Butter	Creamery
Cattle	Dairy and Dairying

CHURUBUSCO, *choo roo boos' ko*, BATTLE OF. See MEXICAN WAR.

CHYLE, *kile*, a form of lymph which differs from ordinary lymph in containing globules of digested fat held in suspension. These fat particles give it a milky appearance. Chyle is found in the lacteals, or lymphatics of the small intestine; in the lymphatics which lead from the small intestine; and in the thoracic duct. The fat of chyle is furnished by chyme, which pours into the small intestine from the stomach. K.A.E.

Related Subjects. The following articles should be read in this connection.

Chyme	Digestion	Lacteals	Lymph
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CHYME, *kime*. When food enters the stomach, the walls of that organ contract in such a way as to impart a sort of churning motion to it. This process continues until every portion of the food has been brought into contact with the gastric juice (see STOMACH), which reduces the food to a pulp called *chyme*. Chyme is a thick grayish-white mass of half-fluid consistency. It passes through the pylorus into the small intestine, where, under the action of intestinal juice, bile, and pancreatic juice, digestion is completed. K.A.E.

CIBBER, COLLEY. See POPE, ALEXANDER.

CIBOLA, *se' bo lah*, SEVEN CITIES OF, were Indian villages in the region of the Southwest now comprising New Mexico. Legendary tales of their wealth—of turquoise-studded doors and streets of goldsmiths making ornaments of gold—inflamed the greed of the Spanish conquerors. Fra Marcos, a Franciscan priest, and a Moor, Estevanico, were the first to see Cibola. (The name is believed to be the Spanish form of *Shivina*, the Indian name for the Zuñi range.) Estevanico was murdered by the Indians, and Fra Marcos, after seeing, from afar, the first of these storied cities, Hawikuh, returned to the city of New Mexico. His tales further excited the Spaniards, and an expedition set out under Coronado. Hawikuh was taken by force, and the conquerors found food—which they sorely needed—but no treasure. All but one of these seven Zuñi cities which proved such an empty lure have been found and excavated by archaeologists in recent years. See ZUÑI.

CICADA, *sie ka' dah*. The cicadas are a family of insects belonging to the same sub-

order as scale insects and plant lice. The most interesting species, often miscalled *seventeen-year locust* (see LOCUST), has a life history extending over a period of seventeen years. Vernon L. Kellogg says: "That a single one of the 300,000 and more known species of insects should have a period of development from egg to adult of more than sixteen years, while this period in all other insects varies from a few days to not more than three years, is perhaps the most striking exceptional fact in all insect biology." The black and green *harvest fly*, or *dog-day locust*, is a two-year *cicada*. Most cicadas are found in the tropics and subtropics, but there are a few species distributed through the temperate regions; those mentioned above are native to North America. Only one cicada is known in England.

The males of cicadas, which live only a few days, make a peculiar rattling sound with three drumlike membranes that are attached to the sides of the body and are operated by special muscles. This sound is supposed to be the mate call. On hot summer days, the shrill, monotonous call of the cicadas may be heard in the trees through the daylight hours, but the sounds cease at nightfall. The females, which are "voiceless," lay their eggs in the twigs of trees or shrubs, in small holes or slits which they cut with the sawlike ovipositor. The damage which they thus do to orchards is often considerable, for the cutting of holes weakens the twigs, and they sometimes break off. The young drop to the ground when hatched, and spend the time until maturity (whether two or seventeen years) several inches or even feet below the ground. Here they subsist by feeding on humus and sucking the juice of tree roots. Finally the nymph crawls out upon the trunk of a tree or a spear of grass, its skin splits open along the back, and the full-grown insect emerges. At first the wings are merely watery sacs, but in a very short time they expand to their full size.

The adult *periodical cicada* ("seventeen-year locust") is a black, stout-bodied insect about an inch and a quarter long, being somewhat shorter than the harvest fly. It has orange-

colored eyes, legs, and wing veins. There are about seventeen broods of this cicada, and the appearance of these broods in various parts of the United States at different times has been recorded by the United States Bureau of Entomology. Information concerning the appearance of a brood and directions for combating the insects may be had on application to the Bureau. The cicadas are not nearly so harmful to agriculture as the aphides and scale insects. In the Southern states, the periodical cicada has a life cycle of thirteen years. W.J.S.

Classification. Cicadas constitute the family *Cicadidae* in the order *Hemiptera* (which see). The periodical cicada is *Cicada septendecim*. It is not related to true locusts.

CICELY, *sis' e le*, or *sise' lie*, SWEET, also known as SWEET CHERVIL, a perennial herb of the parsley family. Its sweetly fragrant leaves, reminiscent of anise, are a familiar seasoning for soups and salads in Europe, but are little known in America except among the foreign element. Roots and seeds are also used for flavoring. Bees find the smell of sweet cicely very attractive, and are sometimes induced to enter empty hives after these have been rubbed with the leaves. The plant is native to Southern Europe and Asia, where it grows along river banks, but it is successfully raised in cottage gardens in England. It grows to a height of about three feet, and has downy gray leaves and small white flowers. The Scotch peasants call the herb *myrrh*. B.M.D.

Scientific Name. Sweet cicely belongs to the family *Apiaceae* (or *Umbelliferae*). Its botanical name is *Myrrhis odorata*.

CICERO, *sis' e ro*, ILL. See ILLINOIS (back of map).

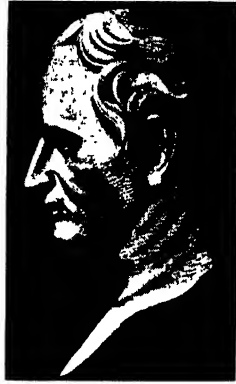
CICERO, MARCUS TULLIUS (106-43 B.C.), an illustrious Roman orator and statesman who lived in the stirring times of the declining republic, universally acknowledged to be "the most eloquent of the sons of Romulus." Born at Arpinum, of an ancient family of the order of knights, he was early sent to Rome to be educated. He completed his regular schooling with courses in law and philosophy, and also received a thorough training in the art of oratory. At the age of twenty-six, he began his public career as a pleader in the law courts; after a period of travel, in which he visited the great centers of learning in Asia Minor and Athens, he returned to Rome and soon rose to first rank among the great orators at the Roman bar.

Cicero was elected quaestor for the year 75 B.C. and was assigned to Sicily, where he so pleased the people by the just performance of his duties that in 70 B.C. they called upon him to conduct their suit against the robber-governor of the island, the infamous Verres.



THE CICADA

Though Verres employed the celebrated Hortensius to plead his cause, Cicero's first speech against him was such a triumph of oratory that he fled into voluntary exile. Cicero then rose rapidly in power and public esteem, gaining the consulship in 63 B.C., through successive steps. It was during his term as consul that he exposed the wicked conspiracy of Catiline (which see), and drove the traitor in shame from the Senate by his masterpiece of oratory known as *The First Oration Against Catiline*.



CICERO

Cicero, then at the height of his power, was hailed as the "father of his country" and the "savior of the state," but there was to be a turn in the tide of his fortunes. Soon after he completed his term of office, his enemies charged him with having executed the leaders in the conspiracy of Catiline without giving them a legal trial, and Publius Clodius, the tribune of the people, raised such a storm of popular indignation that Cicero was forced to go into exile, choosing Thessalonica as his place of refuge (58 B.C.).

Sixteen months later, he was recalled to Rome. Events were moving rapidly forward toward the great struggle for the control of the Roman world, with Caesar and Pompey the leading men in the state. When Cicero returned from a year's administration of the province of Cilicia (50 B.C.), he found Italy on the verge of civil war. He gave Pompey his half-hearted support, and after the latter's crushing defeat at Pharsalia, fled to Brundisium to await the decision of Caesar concerning him. That great leader forgave him and treated him with great kindness, and after Caesar's assassination Cicero composed a series of orations against Mark Antony. These, the celebrated *Philippics*, were the cause of his downfall. When Antony, Lepidus, and Octavius (later the Emperor Augustus) in 43 B.C. formed the Second Triumvirate, Cicero's name appeared on the list of those condemned to death, and while attempting to escape from his villa at Tusculum, he was beheaded by a band of Antony's soldiers.

His Works Are Read To-Day. Cicero ranks among the greatest of the ancient writers, and his orations are unsurpassed in Roman literature for beauty of language and eloquence and grace of style. The four *Orations Against Catiline* are familiar to the high-school student of Latin. Among other writings are

the fourteen *Philippics* against Antony, the essays on *Friendship* and *Old Age*, and numerous charming letters that give a wonderful picture of the age in which he lived.

Related Subjects. For further investigation into the historical setting of Cicero's life, see the following articles in these volumes:

Antony, Mark	Consul
Augustus	Pompey
Catiline	Quaestor
Caesar, Caius Julius	Triumvirate

CICONIANS, *si ko' ni anz*. See ODYSSEY (The Story).

CID, *sid*, **THE**, the name applied in song and story to the great national hero of Spain, who lived in the latter part of the eleventh century. His real name was RODRIGO, or RUY DIAZ; "the Cid" comes from the Arabic *El Seid*, meaning *the lord*. He first appears in history in the reign of Ferdinand I, and under the successors of that monarch, he won distinction as a great warrior. Banished from the realm of Alphonso of Castile, he began the adventurous career of a soldier of fortune, and for years battled for the Arabian kings of Saragossa in Northeastern Spain, fighting their Mohammedan and Christian enemies alike. In 1094 he made himself master of the city of Valencia. After five years of supremacy, during which he assailed many a neighboring fortress, he died of grief on learning of the defeat of an army which he had sent against his Moorish enemies.

The Cid of romance and song, the type of all the manly virtues, is quite a different person from the adventurous Rodrigo of history. The greatest of the early literary works which celebrate his exploits is *The Poem of the Cid* written about 1200, one of the best epics of medieval times. Nearly 200 ballads and innumerable stories and dramas have also been founded on legends concerning him, and he is the hero of a famous tragedy, *The Cid*, by the French dramatist Corneille.

CIDER, *si' dur*, commonly the sweet or fermented juice of apples, although sometimes made of pears or of oranges. Late apples produce the best cider, and red ones are better than the green or yellow. The apples are crushed until reduced to a pulp. The juice is run into casks or barrels, and exposed to the air until it ferments, and a clear amber or light-brown liquor, or "hard cider," is produced. If sweet cider is boiled and bottled, it will keep fresh a long time. Sweet cider contains no alcohol and is therefore not intoxicating. But the longer it stands in the barrel, the more it will ferment and the more alcohol will be produced. The accumulation of alcohol in "hard" cider makes it very intoxicating. It may contain as much as eight per cent of alcohol—as much as a strong wine. Cider brandy, or *applejack*, is distilled from fer-

mented cider. *Apple butter* is made by stewing apples in fresh cider. *Cider vinegar* is made by allowing cider to remain exposed to the air until the alcohol is changed into acetic acid (see VINEGAR; ACETIC ACID).

CIENFUEGOS, *syen fwa' gohs*. See CUBA (Principal Cities).

CIGAR. See TOBACCO.

CIGARETTE, *sig a rel'*, for many years called a "coffin nail" by reformers, in an attempt to discourage its use, is a small, pencil-shaped roll of tobacco in a covering of paper, used for smoking. By many authorities, cigarette-smoking has been regarded as the most injurious form in which tobacco can be employed, and particularly harmful to young persons. Probably no habit which has fastened itself upon a nation was so persistently assailed as that of cigarette-smoking, but the objectors fought a losing battle, for the sale of cigarettes within a score of years rose annually from a few million to more than eighty billion. Whereas, formerly, cigarette-smoking was confined to males, within the last decade the habit has made astonishing advancement among women in all grades of the social scale. See TOBACCO.

Those who oppose the use of cigarettes declare that the smoke in the mouth mixes with saliva, to which it imparts certain poisonous properties arising from combustion of paper and tobacco, which prevent the natural assimilation of food. Nervousness, loss of sleep, and often serious affections of the heart and throat, and disorders of the stomach are among the evil results charged against excessive cigarette-smoking.

More than thirty states of the American Union prohibit the sale of cigarettes to minors; for many years prior to 1927, Kansas did not permit their sale to any person, regardless of age.

CILIA, *sil' e ah*. If we could examine with a microscope the small air passages in our lungs when they are in action, we would see that the inner surface is covered with tiny hairlike bodies that are constantly in motion, and that their movement resembles that of a field of grain when the wind blows upon it. These tiny bodies are *cilia*. Cilia are found in the nasal passages, where they aid in the expulsion of mucus and dust; in the internal ear, Eustachian tube, in the larynx, and in all the small air passages in the lungs. K.A.E.

Related Subjects. The reader is referred in these volumes to the following articles

Lungs Trachea Vorticella

CILIARY MUSCLE, *sil' i a ric mus' l*. See EYE.

CIMABUE, *che mah boo' ah*, GIOVANNI (?-1302) a native of Florence, one of the greatest painters of his age, and gifted also in mosaic work. There is little reliable information con-

cerning his family, and all that is known of him is found in contemporary writings. He did work not only in Florence, but in Rome and in Pisa. In the latter city, he was chief among the makers of the mosaics which are in the apse of the cathedral; also he painted an altarpiece for the cathedral. Probably his most famous painting was a *Madonna*, which adorns a church in Florence; however, modern critics are somewhat in doubt as to the authenticity of this work, some ascribing it to a painter less known, by the name of Duccio. Among the paintings positively known to be those of Cimabue are *The Madonna of Santa Trinita*, in the Academy of Florence; the *Crucifix of Santa Croce*, and frescoes in the Church of Saint Francis of Assisi. He also executed a mosaic figure of Saint John, a notable piece in the cathedral of Pisa. Before Giotto, Cimabue was the acknowledged head of the Florentine school of painters.

CIMBRI, *sim' bri*, a warlike people of the Teutonic race, who, with the Teutons, formed the vanguard of the great German migration that so profoundly affected Roman history. In the year 113 B.C. the Cimbri began a southward movement through the forests of Germany, meeting a Roman army near Noreia, in modern Carinthia, and winning there a great victory. After several years of wandering, during which they defeated two Roman armies, they appeared in Gaul, and were joined there by the tribe of Teutons. This great host then began a southward movement toward Italy, dividing into two sections. The Cimbri planned to cross the Eastern Alps and to join the Teutons in the Po Valley; the latter were to make their way through the Western Alps.

The Romans, terrified at the danger which threatened their city, had placed their great general Marius at the head of their legions to check the invading hordes of barbarians. Marius hurried to Southern Gaul, where he totally routed the Teutons at Aquae Sextiae (Aix), in 102 B.C. He then recrossed the Alps to intercept the Cimbri, who were pouring into Northeastern Italy, and in a terrible battle near Vercelli (101 B.C.), annihilated them. Over 100,000 were slain, and 60,000 were taken captive and sold as slaves. The Cimbri were the first Teutonic invaders of Italy; many other such onslaughts followed. See MARIUS, CAIUS. C.W.

CIMMERIANS, the name of two peoples in legend and history. The legendary Cimmerians were a mythical race mentioned in Homer, who were described as living on the shores of the ocean, in an indefinite Far West. The later historical Cimmerians lived along the northern shore of the Black Sea. They flourished in the seventh century.

CIMON, *si' mon* (? -449 B.C.), a famous general and statesman of ancient Athens, the

son of Miltiades, hero of the Battle of Marathon. He distinguished himself at the great naval battle at Salamis (480 B.C.), during the second invasion of the Persians, and rose to the chief command of the Athenian fleet. In 466 B.C., at the mouth of the River Eurymedon, he defeated the Persians both on land and on sea, destroying 200 of their fleet of 350 vessels. Cimon soon became the most influential man in Athens, but his policy of seeking the friendship of Sparta aroused the opposition of the democratic party, led by Pericles, and in 461 B.C. he was ostracized. After his recall from exile, he again led the Athenian fleets against the Persians, and died while besieging the Persian garrison of Citium in Cyprus. See OSTRACISM.

CIMRI, *sim' re*. See WALES (History).

CINCHONA, *sin ko' nah*, OR **CHINCHONA**, the name of a valuable genus of South American woody plants, from the bark of which the drugs quinine and cinchona are obtained. The latter has much the same effects as quinine (which see), but is not so powerful. *Peruvian bark* and *Jesuits' bark* are some of the descriptive names used for the drug-producing barks. The plants producing them are trees or large shrubs of the madder family. They are evergreen, with simple, opposite leaves and white, rose-colored, or purplish, fragrant, lilac-like flowers. The bark is taken off in strips, longitudinally. At one time the cinchona trees were cut down to obtain the bark, but less wasteful methods

are now used to obtain an increased yield. Cinchona plants were first found in Peru and Ecuador, but their culture has been extended



CINCHONA

Appearance of tree, or plant; leaves; blossoms, and detail of blossom.

to India and other parts of the Orient. See ECUADOR; PERU (History). B.M.D.

Scientific Name. The cinchona genus belongs to the family *Rubiaceae*. The principal species yielding quinine is *Cinchona officinalis*.

CINCINONINE, *sin' ko nin* See ALKALOIDS.



CINCINNATI seen from KENTUCKY

CINCINNATI, *sin sin nal' i*. OHIO, the second city in the state in size (after Cleveland), and the county seat of Hamilton County, is the largest city in the United States near the center of population. It has been called the

"most northern southern city and the most southern northern city," a phrase that aptly describes its location in the southwestern corner of Ohio. Cincinnati lies on the north bank of the Ohio River, midway between its

source at Pittsburgh and its mouth at Cairo, Ill., and between the Big and the Little Miami rivers, both of which flow into the larger stream. The mouth of the Licking River is opposite the city, on the Kentucky side of the Ohio. The city of Louisville is southwest 110 miles by rail and 130 miles by water. Chicago is about 300 miles northwest, and Columbus, the state capital, is 120 miles northeast.

Cincinnati is a center of rail, water, and motor routes. It is served by nine railroads, operating nineteen trunk lines, and is the only city in the country, if not in the world, owning a steam railway—the Cincinnati Southern. Two national motor highways intersect in Cincinnati—the Atlantic and Pacific and the Dixie—and three others pass through the city. As a result of extensive dam and lock construction on the Ohio, that river is navigable from Pittsburgh to the Mississippi River, and Cincinnati thus has a position on an inland waterway route 15,000 miles long, with an outlet on the sea. The advantages of location have helped to make it one of the great industrial centers of the Middle West.

Population, 1928, 413,700 (Federal estimate). About eighty-six per cent of the inhabitants are American-born.

General Description. Rising from the Ohio on two terraces to meet the encircling hills in the background, Cincinnati occupies a site of extraordinary beauty. On the highlands, 400 to 460 feet in elevation, are the city's choicest residential sections—Mount Auburn, Fairview Heights, College Hill, Price Hill, Walnut Hills, Avondale, and others. With their woods and picturesque ravines, the highlands provide a delightful setting for the beautiful homes scattered over this region, and the hill summits command fine views of the winding river and rolling landscapes about the city and on the Kentucky side. A great watch factory occupies a site on one of the hills.

The wholesale and manufacturing sections of Cincinnati cover the lower terrace, some sixty-five feet above low water, while the closely built business district occupies most of the second plateau, which is 100 to 150 feet above low water.

The area of the city is about seventy-two square miles.

Among the neighboring suburbs included in the metropolitan area, which has a population of 750,000, are the Ohio towns of Norwood, Bond Hill, Elmwood, Carthage, Westwood, Madisonville, and Oakley; across the river in Kentucky are Dayton, Bellevue, Ludlow, Covington, Newport, Fort Thomas, Southgate, and Latonia (with its noted race track). All are cities of considerable size in themselves, and are easily reached by electric railway and the motorbus.

The Ohio River is spanned by five

bridges, one exclusively for railway traffic, two for highway, and two for both. The Cincinnati Suspension Bridge, with a span of 1,057 feet, is said to be the first bridge of its kind built in the United States (1883); the Cincinnati Southern bridge has one of the largest truss spans in the world.

Six miles distant, in the highlands of Kentucky, is Fort Thomas, one of the most important military posts in the United States. On Mount Lookout, six miles from the center of the city, is located the Observatory of the University of Cincinnati. A short distance below Cincinnati, on the Ohio, stands the tomb of former President William Henry Harrison, the first Chief Executive from Ohio.

Parks and Recreation Centers. The different sections of the city park system, comprising 2,661 acres, are connected by a chain of boulevards and parkways. Of comparatively recent construction is the Parkway Boulevard, a spacious thoroughfare built over the roadbed of the old Miami Canal, providing a traffic lane through the center of the city. Beautification of the parks and boulevards, playgrounds,



NEW CHAMBER OF COMMERCE

bridges, and transit facilities is under the supervision of a city-planning commission. Of the seventy-seven parks, Eden Park, on the east side, near the Ohio River, is one of the finest. The Art Museum and Art Academy are located within its grounds, and adjoining it, on Mount Adams, is the Rookwood Pottery establishment. The park contains two beautiful reservoirs and a tall water tower which affords delightful views of the country roundabout. Much admired, too, is its medieval entrance, Elsinore Gateway. Burnet Woods Park, in the Highland section to the north, includes the grounds of the University of Cincinnati. In Lytle Park, a chief point of interest is a statue of Lincoln by Barnard, the gift of Mr. and Mrs. Charles P. Taft. A conspicuous structure in the heart of the city is the Tyler-Davidson Fountain, on Fountain Square, between Vine and Walnut streets.

The Central Parkway has been opened from the heart of Cincinnati to Ludlow Avenue, and is one of the most outstanding accomplishments for the promotion of the city for many years. It was completed and turned over to the city government and the people by the Board of Rapid Transit Commissioners in 1928. It cost \$4,250,000.

Other parks and recreation centers include Ault, Lincoln, Washington, Mount Storm, Alma, and Mount Echo parks, the Mount Airy Forest project (1,132 acres), the Zoölogical Garden, with one of the largest collections of wild-animal life in America, and scores of playgrounds and athletic fields. The Cincinnati "Reds" have a fine baseball park in the city.

Institutions. Cincinnati is recognized as a leading educational center. Its municipally owned university is famous (see subhead, below). Among other important institutions of higher learning are Saint Xavier College, Lane Theological Seminary, Ohio Mechanics Institute, Hebrew Union College (the principal one in the United States for the education of rabbis), and two conservatories of music of national repute. The Symphony Orchestra is also nationally famous. Among the benevolent institutions are the General and Children's hospitals. The former is one of the largest municipal hospitals in America, having twenty-four buildings on a tract of sixty-five acres.

Transportation. Because of its various trunk lines leading southward, Cincinnati is called "the gateway to the South." The principal lines connecting with the Southern states east of the Mississippi are the Southern Railway, the Louisville & Nashville, and the Illinois Central. Other trunk lines radiating from the city include the Chesapeake & Ohio, the Norfolk & Western, the Baltimore & Ohio, the Pennsylvania, the Erie, and the Big Four. The municipally owned Cincinnati Southern Railway, extending from Cincinnati to Chatta-

nooga, a distance of 338 miles, is leased by the Southern Railway. The city also has numerous interurban and motorbus lines. The Ohio River is used for heavy freight like coal, lumber, and iron, and packet service is maintained between Cincinnati and Louisville and other river points. The great movable Fern Bank Dam, twelve miles down the Ohio, facilitates commerce. Near the city are the Lunken and Watson airports; Cincinnati is a station in the air-mail service.

The new Union Station will be located in the western part of the city. It will not only include a passenger terminal, but freight and transfer terminals, as well. The total cost will be not far from \$75,000,000.

Commerce and Industry. The immediate trading area of the city extends north and east for thirty miles, westward over a fifty-mile radius, and southward for ninety miles. Within a radius of 800 miles are over three-fourths of the country's inhabitants. Profiting by its facilities for receiving and shipping raw materials and manufactured goods, and its strategic position with respect to markets, Cincinnati has enjoyed long-continued industrial prosperity. Over 3,000 industrial plants in the city and suburbs produce goods having an annual value of nearly a billion dollars. According to the United States census of manufactures, Cincinnati proper ranks fifteenth among all American cities in value of products, and of 333 major types of industry listed in the census report, it is represented by about one-third. The most important products include soap, machinery and other metal products, clothing, shoes, radio sets, synthetic plastics, engineering specialties, furniture, playing cards, and printing inks. Printing and publishing, including music publishing, is also well represented, and the exquisite Rookwood pottery produced at Mount Adams is nationally famous.

The city was once important as a center for the manufacture of iron and its various products. This industry has languished, but manufacturers of many articles of iron and steel consume iron that is manufactured elsewhere. Slaughtering and meat-packing is now less important than formerly.

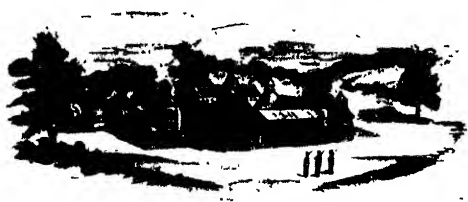
The city is a leading soft-coal center, handling over 650,000 carloads annually, and is also an important lumber market. It ranks, too, among the first five American centers recognized by foreign buyers. It is a prominent banking and insurance center; the Union Central Life Insurance Company has erected here a building thirty-four stories high, one of the tallest buildings west of New York.

The Lunken airport, in the eastern part of the city, comprises 700 acres, has a 3,800-foot runway, and is only five miles from the city postoffice. Watson airport, formerly Grisard, at Blue Ash, comprises 100 acres.



WITHROW HIGH SCHOOL

History. When the site occupied by Cincinnati was first visited by white men, it was thickly dotted with the ancient work of the Mound Builders. The first permanent settlement was made in 1788, by a party of pioneers who came down the Ohio River, and was called Losantiville, a name taken from the Latin and French, and meaning "City opposite the mouth of the Licking." In 1790, General Arthur Saint Clair assumed command of Fort Washington, erected in the previous year. He



IN 1787

When Cincinnati was Fort Washington.

changed the name of the village to Cincinnati, in honor of the Society of the Cincinnati, an organization composed of former officers of the Revolutionary War, of which he was one (see CINCINNATI, SOCIETY OF THE). In 1802, the place was chartered as a village, and it was incorporated as a city in 1819, when the population was 7,500.

Several times the city has been visited by floods, the overflow of 1832, when the lower part of the city was submerged, being the most destructive. During the War of Secession, the city was a harbor for slaves seeking refuge

in Canada. It was in Cincinnati that Harriet Beecher Stowe gathered material and wrote *Uncle Tom's Cabin*.

Cincinnati adopted the city-manager plan of government in 1926. The city manager is selected by the council, and he receives a salary of \$25,000 per year. W.P.B.

Cincinnati, University of, the first municipally owned university to be founded in the United States. In 1858 Charles McMicken left a fund of \$1,000,000 for the founding of a city college in Cincinnati, but as the will was not held valid by the state of Louisiana, in which a part of the estate was located, the university was not established until 1870, when the legislature passed a special bill for its organization. The institution was opened for instruction in 1873, and it now occupies several handsome buildings in Burnet Woods Park, on a campus of forty-three acres. Except for small fees, the university admits students who reside in the city without payment of tuition. There are about 550 instructors, and more than 8,000 students are enrolled. The institution is supported by the city by public taxes, by the income from the original endowment, and by voluntary gifts.

In several ways the city and the university are directly related. In 1912 a Bureau of City Tests was established in the college of engineering, in connection with the engineer's office of the city Department of Public Service. The bureau makes all the tests of materials and supplies required by this and other city departments, and a technical chemist is employed to direct the work. A Municipal Reference Library, with quarters in the city hall, was organized in 1913, under the department of political science of the college of liberal arts. The library contains material relating to all phases of city government and municipal activities, and is open not only to the members of the city council and the administrative officers of the city, but to the student body and to the general public.

Another valuable feature of the university administration is the coöperative system of education in the college of engineering and commerce, whereby students alternate their university studies with practice work in shops and factories.

CINCINNATI, SOCIETY OF THE, a patriotic memorial society, organized by officers of the Revolutionary army, American and foreign allies, to perpetuate the remembrance of the war and the mutual friendships "formed under pressure of common danger." It was organized in 1783, while the Continental army was at Fishkill, on the Hudson River. Like Cincinnatus (which see), they had left the plow to serve their country and were returning to it when the need was over, so they selected the name in his honor. All Continental officers who had served three years, or who had been honorably discharged, were accorded membership, and also the male descendants of such officers.

The society had thirteen branches, one in each of the original states. The first meeting was held at Philadelphia



BADGE OF THE SOCIETY

of membership through heredity opposed the principle of democracy upon which the republic was organized. An interesting result of this feeling was the organization at New York, in 1789, of the Tammany Society as a body in which equality should govern, not right of birth. Continued opposition caused the decline of the Cincinnati, and for many years after 1830, it was practically out of existence. A revival began in 1893, however, and by 1902 all of the thirteen old state societies were again active. See TAMMANY SOCIETY.

CINCINNATUS, *sin sin a' tus*, LUCIUS QUINTIUS, a virtuous, simple-mannered hero of the early days of the Roman republic. He was an unyielding patrician, and naturally was strongly opposed to all attempts at the equalization of patrician and plebeian. About 460 B.C., so the story runs, when the consul Minucius was surrounded by the Aequians, the Senate sent messengers to summon Cincinnatus to the dictatorship. Rich though he was, the messengers found him plowing his farm. At the call he hurried away, rescued the army, marched to Rome laden with spoils, and after sixteen days of dictatorship quietly returned to his plowing. At the age of eighty, he was again appointed dictator, to suppress the ambitious plebeian Maelius. See CINCINNATI, SOCIETY OF THE; also PATRICIAN; PLEBEIAN.

Cincinnatus of the West. George Washington, like Cincinnatus, left comfort and home when his country called, and at the end of the war, during which he became one of the commanding figures of the world, returned modestly to the affairs of his Mount Vernon homestead. So Lord Byron called him the *Cincinnatus of the West*, and the designation caught the popular fancy.

CINDERELLA, *sin dur el'ah*,



THREE EPISODES IN THE STORY OF CINDERELLA

Cinderella in her corner is visited by the fairy godmother. At the prince's ball, from which she escaped on the stroke of midnight, losing the wonderful slipper. After tireless search the prince discovered that the slipper belonged to Cinderella, much to the dismay of her scheming sisters.

in May, 1784, with George Washington as president. There was much opposition to the society, as it was believed that the idea

the beautiful, mistreated heroine of a fairy tale that has been the delight of children of almost every land. The story of the ragged

little girl who was ridiculed by her proud stepmother and jealous sisters as she sat amidst the ashes and cinders in the chimney corner, and who through a fairy godmother finally married the prince of the realm because she was the only maiden in the land who could wear the wonderful glass slipper, is a children's tale of absorbing interest. Long before the Christian Era, a version of the story of Cinderella was known by the Egyptians, and they wrote it in their strange characters for their children to read; it was familiar also to the Greeks. It may be found among the German folklore tales of the sixteenth century, and in the delightful collections of fairy stories for which we are indebted to the Brothers Grimm. The central idea of the story has been made the basis of many modern plays because it touches a universal chord in the human heart.

The various English versions are adaptations of the narrative of Charles Perrault, a famous French writer of fairy tales. He called his story *Cendrillon*, and in it used the expression *pantoufle en vair*, meaning *a fur slipper*. The early English translators mistook the term *en vair* for *en verre* (of glass), and so the glass slipper of Cinderella is really an erroneous feature of the story. However, it has become so vital a part of this loved tale that English readers will always believe that it was a glass slipper through which the "cinder-girl" became the bride of a prince.

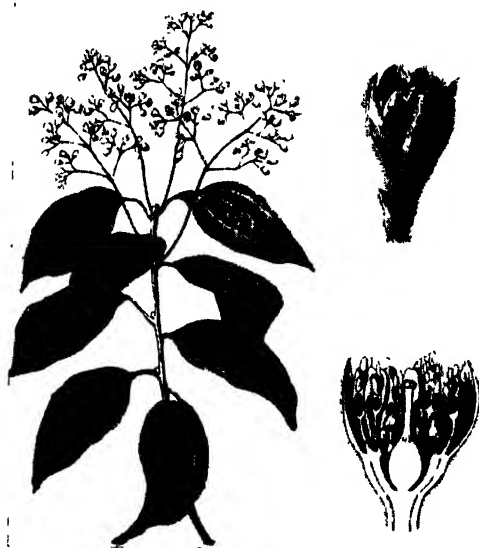
CINERARIA, *sin' e ra' ri ah*, a genus of popular greenhouse herbs or small shrubs whose lower leaves have an ashy appearance; hence the name, from the Latin word for *ashes*. Although natives of South Africa, a number of species are cultivated throughout the world for garden purposes, and from these an almost endless variety of blossoms of many different colors have been produced. Purple, red, and purple and white are the prevailing colors; in early spring, the crowded sprays of dark-eyed asterlike flowers with velvety leaves are everywhere seen in park conservatories. They are easily grown from seed and make beautiful window-garden plants. B.M.D.

Classification. Cinerarias belong to the family *Compositae*, along with asters, sunflowers, and thistles (see COMPOSITE FAMILY)

CINNABAR, *sin' na bahr*, the most important mercury ore. It is a very heavy mineral, composed of mercury and sulphur. Although usually found in a granular, bright-red earthy form, it is sometimes obtained in crystals, and is abundant in Spain, California, and China. Artificial cinnabar, formed by purifying a mixture of sulphur and mercury, is brighter in color than the true cinnabar, and is used for paint under the name *vermilion*. See MERCURY. A.N.W.

Chemical Formula. The formula for cinnabar is HgS ; that is, a molecule contains one atom each of mercury and sulphur.

CINNAMON, a delightfully fragrant spice, used in cookery and known since Biblical times. It is the inner bark of the under branches of a species of laurel, chiefly found in Ceylon, but growing also in Malabar and other tropical regions. The tree reaches a height of twenty or thirty feet, has oval leaves, pale-yellow flowers, and acorn-shaped fruit. Under cultivation it is customary to dwarf the trees by cutting back to the buds. The Ceylonese bark



CINNAMON

Leaves, detail of flower, and fruit.

their trees in April and November. In the process of drying, the bark turns to a soft light-brown color and curls up into rolls or quills. The smaller quills are placed in the larger ones for shipping. Tasters assort them as to quality, and they are made into bundles weighing about ninety pounds, ready for the market.

An oil of cinnamon is prepared in Ceylon, but the oil of cassia is generally substituted for it. Indeed, because of the wide use of cinnamon in the countries where it is grown, the cassia bark is often substituted for cinnamon, to which it has some resemblance (see CASSIA). The leaves, the fruit, and the root of the cinnamon plant all yield oil of considerable value. That from the fruit, being highly fragrant and thick, was formerly made into candles for the sole use of the king of Ceylon. B.M.D.

Scientific Name. The cinnamon tree belongs to the family *Lauraceae*. Its botanical name is *Cinnamomum zeylanicum*. Cassia bark is *C. cassia*.

CINQUEFOIL, *sing' foil*, also called FIVE FINGER, and sometimes known as FALSE STRAWBERRY, is one of the most troublesome of several related species of weeds. It is an introduced form, occurring native in Europe, but now found throughout Eastern North America, extending westward to Kansas. Its introduction seems to have accompanied clover-seed importation. The plant is not typically a "five finger," as there are three leaflets; it is a yellow-flowered annual, and is eradicated by cultivation. B M.D.

Classification. The scientific name of the introduced cinquefoil is *Potentilla monts-peliensis*. It is a member of the family *Rosaceae*.

CION. See GRAFTING.

CIPANGO, *sih pang' go*, an old name for Japan. See COLUMBUS, CHRISTOPHER; JAPAN.

CIRCISSAINS, *sur kash' anz*. The name applies particularly to the people of the Transcaucasian Soviet Socialist Republic; they are called Tcherkesses by the Russians and Turks, but Adighes by themselves. As a people, they are remarkable for their warlike character, but they possess simplicity of manner and beauty of form and feature. In these respects, they surpass all other tribes in Caucasia. "Circassian belles" are often referred to when standards of beauty are discussed, and with reason, for this part of the world is famous for its handsome women.

Although the Circassians are said to have fine mental qualities, they have no written language, but depend on their memories for transmitting from one generation to another their wisdom and knowledge and memories of warlike deeds expressed in verse. This was the custom of people in ancient times. They are for the most part a sturdy and upright race, their great fault being the sale of their daughters to the harems of Turkey and Persia. In religion the upper classes are Mohammedans, but the lower classes practice a curious mixture of paganism and Christianity.

Circassia, *sur kash' ih ah*, a name formerly given to the northwestern part of the Caucasus, lying between the mountains and the Black Sea. It now forms part of the Transcaucasian Soviet Socialist Republic. (See RUSSIA). Although an old country, Circassia's chief historic interest lies in the struggle to free itself from Russian rule, which lasted from 1820, when, by the Peace of Adrianople, it was ceded to that country, until 1864, when its conquest by Russia was complete. After this the defeated people emigrated to Turkey in such great numbers that the land was almost depopulated.

CIRCE, *sur' se*, in Greek legend a beautiful sorceress, said to have been the daughter of Helios and the sea nymph Perse. For the murder of her husband, she had been banished to the island of Aeaea, on the coast of Italy. Thither she lured unfortunate travelers, and by means of drugs and enchantments changed

them to animals. While Odysseus (Ulysses) and his companions were seeking their way home to Ithaca, after the fall of Troy, they came to the island of Circe, where all the companions fell under the spell and were changed to swine. Odysseus himself escaped by using the herb given him by Hermes, and he compelled Circe to restore his companions to human form. The best-known story of Circe is to be found in the *Odyssey* of Homer.

Related Subjects. The reader is referred in these volumes to the following articles.

Helios Mythology Odyssey Ulysses

CIRCLE. A circle is a curved line in a plane, all points of which are equally distant from a point within, called the center.

Parts of a Circle. *Circumference.* The length of the curved line is called the *circumference* of the circle.

Radius. The distance from the center to the circle is called the *radius*.

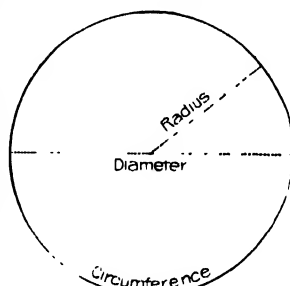
Diameter. A straight line passing through the center of a circle and terminated at both ends by the circle is called a *diameter*, a term derived from a Greek word meaning *measure through*. The radius is one-half the diameter. Any diameter of a circle divides the circle into two equal parts.

Arc. Any portion of the circle between two of its points is called an *arc*.

Chord. A straight line joining two points of a circle and terminated by these points is called a *chord*. A diameter is the longest chord of a circle.

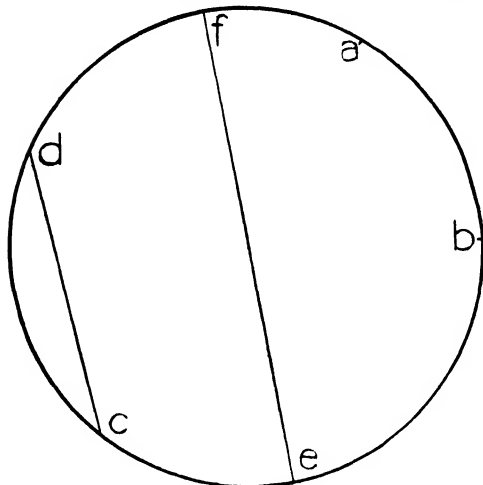
The curved line *ab* is an *arc*. The straight line *cd* is a *chord*. The straight line *ef* is a *diameter*; it is the longest chord of the circle, being a diameter.

Relation of Circumference to Diameter and Radius. Measure the circumference of a circle; then measure its diameter; for example, the circumference and diameter of a cylindrical drinking glass; of a round dining table; a bicycle wheel or wagon wheel; a barrel head, and so on. By these measurements you will discover an interesting fact, namely, that there is always the same relation between the circumference and the diameter of a circle. Your measurements must be carefully made to get this relation. You will see, very roughly at first, that the circumference is 3 and some fraction times as great as the diameter. With close work, you will find the relation to be about 3½. The fact has been proved that



the circumference is 3.14159+ times as great as the diameter. The decimal has been carried out very many places, but for most prac-

Compare the area of a (which is $\frac{1}{4}$ of the area bounded by the circle) with the area of the square in which it is. The eye tells you it is



tical uses, 3.1416 is used. We state this fact in mathematics in this way:

$$\text{Circumference} = 3.1416 \times \text{diameter}$$

or

$$c = 3.1416 \times d$$

or

$$c = \pi \times d$$

In the last equation, we use the Greek letter π (pi) to stand for the number 3.1416. We always find that mathematicians, when they have to use a certain number many times, find or invent some symbol for it, and so they have chosen the symbol π to mean 3.1416, or the ratio of the circumference to the diameter of a circle. This relation is very generally expressed in terms of radius instead of diameter, and the desirable formula to remember is

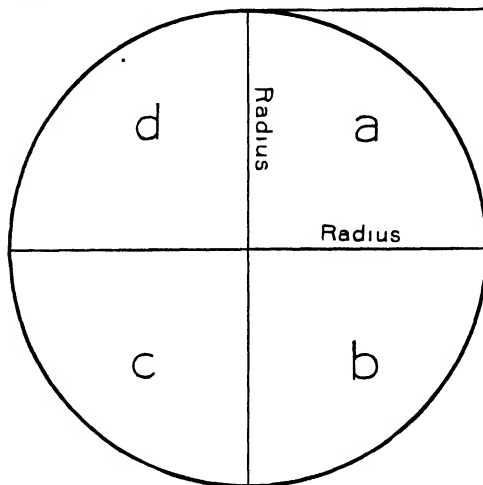
$$\text{Circumference} = 2 \times \pi \times \text{radius},$$

using $2 \times \text{radius}$ instead of diameter. It is shortened to this form by omitting the times sign:

$$\text{Circumference} = 2\pi r$$

Many ancient peoples knew in a general way of this relation, but for centuries the Eastern peoples and the Greeks used it as 3. The Jews used the value as 3, without the added decimal, as indicated in the description of Solomon's Temple in *I Kings*, vii. Hiram, king of Tyre, it is related, made for the Temple a circular basin, called a "molten sea," which was "10 cubits from the one brim to the other"; while a "line of 30 cubits did compass it round about."

Area of Circle. Draw a circle; draw its horizontal diameter and its vertical diameter; draw a square on the radius, as in the figure shown in the next column.



about $\frac{1}{4}$ of it. Is it more or less than $\frac{1}{4}$ of it? It is a little more than $\frac{1}{4}$ of the square. So we see that $a + b + c + d$, or the whole area, is a little more than $4 \times \frac{1}{4}$, or 3 and a fraction, times as great as the square of the radius. With the eye we cannot tell just what this fraction is, but it has been proved that the "area of a circle" (which means the area bounded by the circle) is 3.14159+ times as large as the square built on the radius of the circle. It is put into a short form as follows:

$$\text{Area of a circle} = 3.1416 \times \text{radius}^2$$

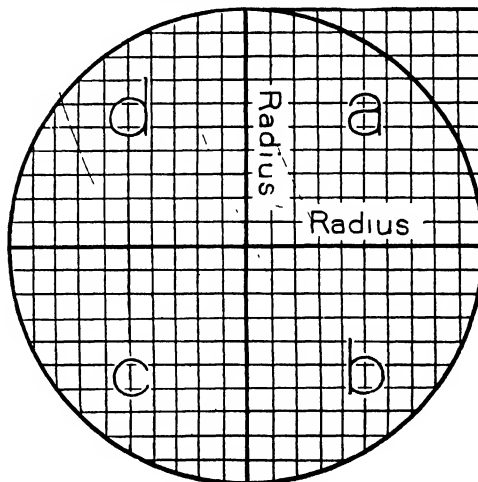
or

$$\text{Area of circle} = \pi \times r^2$$

or

$$\text{Area of circle} = \pi r^2$$

This can be seen very clearly by making your drawing on squared paper, thus:



Here you may find, by actual count of the little squares, how many times as large the circle is as the square built on the radius.

Problems. 1. What is the circumference of a cylindrical iron pipe whose diameter is 10 inches?

Solution. Circumference = $2\pi r$.

Circumference in inches = $2 \times 3.1416 \times 5 = 31.416$.

2. If a bicycle wheel has a radius of 14 inches, how long is the circumference of the wheel?

Solution. Circumference = $2\pi r$.

Circumference in inches = $2 \times 3.1416 \times 14 = 87.9648$ inches.

3. What is the circumference of a stack of hay at the bottom if the radius is 9 feet?

4. What is the circumference of a circular pond 40 feet in diameter?

5. John and Harry set up a circular tent in their yard at the foot of a tree. They erected the center pole at a point six feet from the tree. How many



square feet of ground did the tent cover? How many yards around was the space enclosed by the tent? See illustration.

Solution. The distance from the pole to the tree is the radius of a circle.

Area of circle = πr^2 .

Number sq ft covered = $3.1416 \times 6^2 = 113.0976$.

The distance around the space enclosed by the tent is the circumference of the circle whose radius is 6 feet.

Circumference = $2 \times \pi \times r$.

$$\text{Number of yards around} = \frac{2 \times 3.1416 \times 6}{3} = 12.5664.$$

6. Find the cost of clearing a circular skating pond 300 feet in diameter, when the snow is 6 inches deep

on the ice and it costs \$.10 a cubic yard to clear it away.

7. A cart-wheel, 3 feet in diameter, turns around at the rate of 40 miles an hour; how many revolutions does it make in 1 hour? J.W.Y.

CIRCULATION OF THE BLOOD. See BLOOD, subhead.

CIRCUMFERENCE. See CIRCLE.

CIRCUMSTANTIAL, *sur kum stan' shal*, **EVIDENCE.** See EVIDENCE.

CIRCUMVENTION, *sur kum ven' shun*, **GAME OF.** See CHECKERS.

CIRCUS. "Circus day" is a never-to-be-forgotten event, especially to the boy or girl in the country. First, the billboards with their amazing pictures advertise the coming wonders; and then, when at last the day arrives, early in the morning, before sunrise even, the howling of the animals tells the boy the "circus has come to town." So off he hurries to watch the absorbing task of unloading. Later in the day he hears the bands playing, and sees the parade. Still later, he goes to the big white tent, where he thrills at the daring deeds of the acrobats and bareback riders, or laughs at the antics of the clowns.

Since the time of Phineas T. Barnum (which see), the American circus has been a popular form of amusement. Originally, it had but one ring and about six performers, but it now has two or three rings, and employs as many as 3,000 people, including workmen. In early days, it traveled by teams, but now it owns its own railroad trains, excepting engines. In large cities, the performances are sometimes given in covered amphitheaters.

The Roman Circus. The circus originated among the Romans, and first consisted merely of horse and chariot races; the name means *ring*, or *circle*, from the circuit made by the racers. Later, wrestling, athletic contests of all kinds, and other games were added, and large sums of money were spent to bring wild animals from different parts of the country to be killed in the arena, or center of the circus.

A nearly oblong building without a roof formed the circus of Roman times. The seats were ranged on two sides, in tiers similar to the arrangement in the modern football stadium. Many were of marble, and all were built as permanent structures, as are the hippodromes of to-day. On the outside, the circus was surrounded with colonnades, galleries, shops, and public places, like the side shows and refreshment booths of the circus of to-day.

There were eight or ten circuses at Rome, the largest of which was the *Circus Maximus*, 1,875 feet long and 625 feet wide, capable of seating 260,000 spectators. An illustration appears on opposite page.

CIRRHOSSIS, *sih ro' sis*, a hardening of the liver, kidney, or other organs, due to an overgrowth of fibrous tissue. It is a mild inflam-

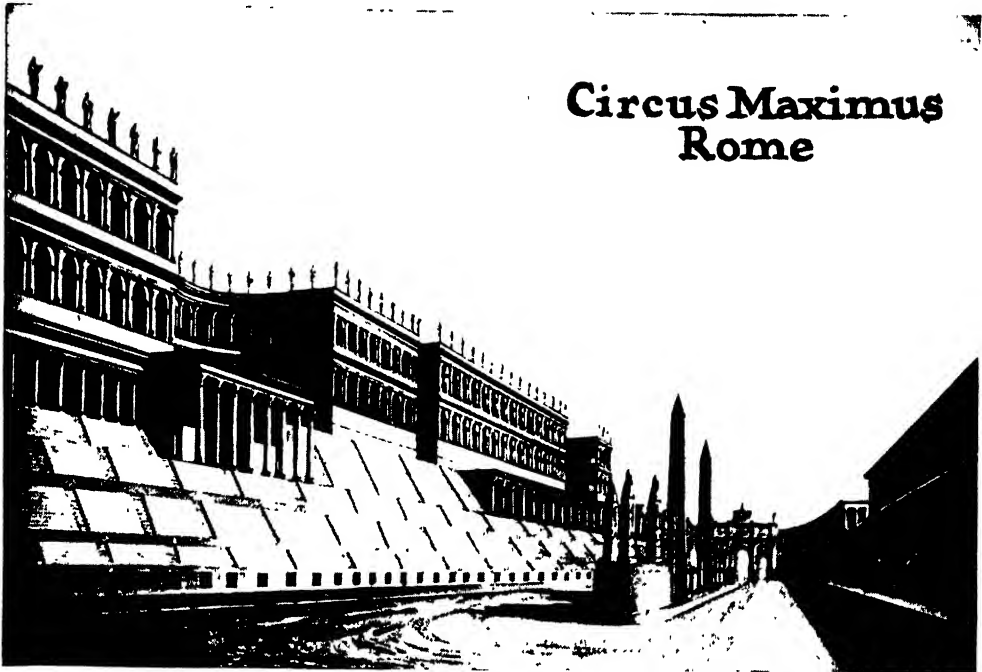


Photo Visual Education Service

Circus Maximus Rome

matory disorder which results in decreasing the size of the organ through wasting of the cells. Cirrhosis of the kidney is known as chronic Bright's disease (which see). In cirrhosis of the liver, that organ is small, hard, and knobbed in appearance. Dropsy of the abdomen is prominent in cirrhosis of the liver. See LIVER.

W.A.E.

CIRRUS, *sih' rus*, a form of cloud (which see).

CITADEL, *THE*. See SOUTH CAROLINA (Education).

CITATION, *si ta' shun*. See PROBATE.

CITHARA, *sith' a rah*. See ZITHER; LUTE.

CITIES, DISTANCES BETWEEN. See DISTANCES BETWEEN CITIES.

CITIES, LARGEST. See CITY.

CITIES OF REFUGE, in the story of the Children of Israel, six out of forty-eight cities given to Canaan in the division of the tribe of Levi, which were set apart as places of refuge for the "slayer that killed any person unawares and unwittingly" (see *Joshua*, xx). Whoever fled to one of these cities was protected temporarily from any avenger who might pursue him, and was permitted to plead his cause in the hall of judgment. If found not guilty of wilful murder, he could live in the city until the death of the high priest, when he was at liberty to return to his home. If adjudged guilty, however, he was returned for punishment to the place from which he had fled. These cities were Kedesh, Shechem, and Hebron, on the west side of the Jordan, and

Bezer, Ramoth-Gilead, and Golan, on the east. The temples and altars of the gods were sacred places of refuge for the ancient Greeks and Romans, and for a long period the Christian churches provided a similar asylum. See ASYLUM; BLOOD, AVENGER OF.

CITIZEN, in the broadest sense, is a member of a political state, which, in return for allegiance, guarantees its protection to persons and property, and ensures the enjoyment of certain rights and privileges.

In theory, a government not only guarantees its citizens security at home, but extends its protection to them while they are absent in foreign lands. The security which an alien enjoys in a foreign country indicates the strength of his home government and the prestige in which it is held by the other nations of the world. A person takes pride in his citizenship; thus Paul said, "I am a citizen of no mean country," a modest tribute to the honor of being a Roman. Because he was a Roman, he was once saved from death.

A Citizen of the United States. According to the Constitution, "All persons born or naturalized in the United States, and subjects thereof, are citizens of the United States, and of the state wherein they reside." Women and boys and girls are citizens as well as men, and Indians who have adopted the dress and customs of civilization and have abandoned tribal relations are admitted to citizenship. This privilege, however, is denied Chinese, Japanese, Burmese, and Hawaiians.

Before 1922, when an American woman married an alien, she forfeited her American citizenship. Under the Cable Act, of that year, if such a woman marries an alien who is himself eligible in due course to become an American citizen, she does not suffer the loss of her own citizenship by reason of such marriage, but she may choose in a formal manner to renounce it. Hereafter an alien woman will not automatically become an American citizen through marriage to a native-born or naturalized American, but must acquire citizenship, if she wishes, through compliance with the naturalization laws, modified in her case by omission of the otherwise required declaration of intention and by reduction of the period of residence from five years to one. See NATURALIZATION.

A Citizen of Canada. Persons born in the Dominion are Canadian *citizens* and British *subjects*, and citizenship is likewise granted to a person born out of the realm whose father is a British subject either by birth or naturalization. A person naturalized in Canada is a British subject in every other portion of the British Empire, and vice versa. Before naturalization can be granted in Canada, the applicant must have resided in Canada for not less than one year immediately preceding the application, and must have resided either in Canada or in some other part of Britain's dominions for a period of four years before the application. Each of the provinces regulates by law the granting of the right to vote.

Derivation and Application. The term *citizen* is derived from the Latin *civis*, meaning *citizen*, from which comes also the word *city*. To the ancient Greeks and the Romans, however, *citizen* did not signify a resident of a town, but a member of a free, self-governing commonwealth, and it is used in the same sense to-day. In monarchical nations, however, the relation of citizenship to the government is expressed by the term *subject*, though the term is falling into disuse, and *citizen* is applied to a local resident.

CITIZENS' MILITARY TRAINING CAMPS. See ARMY (Armies of the World; United States).

CITRANGE, *sil' raynj*. See BREEDING (Plant Breeding).

CITRATES, *sil' rates*. See CITRIC ACID.

CITRIC, *sil' rik*, **ACID**, an acid found in many common fruits, such as gooseberries and red currants, and especially abundant in the citrus fruits—lemons, oranges, and limes—from which it takes its name. It is generally prepared for commercial use from lemon juice. It can also be made from glucose (which is made from cornstarch) by a special kind of fermentation. When pure it is white and odorless, with a pleasant, sour taste. In combination with metals, it forms crystalline salts, known as *citrates*, which are used in medicine as cooling drinks. Effervescent citrates of mag-

nesium, used as easily taken and pleasing laxatives, are mixtures which, when dissolved in water, produce magnesium citrate by chemical action. Carbonic-acid gas is formed as another product of such action, and it is the escaping bubbles of this gas which cause the effervescence, or "fizzing." Sometimes the term is applied erroneously to other effervescent, laxative medicines. Crude citric acid is used to prevent the formation of colors not wanted in calico-printing, as a substitute for lemon juice in making beverages, and in the confectionery trade. T.B.J.

Chemical Formula. The formula for citric acid is $C_3H_4(OH)(COOH)_3$. In this formula two radicals are represented, groups of atoms which do not alter their position in chemical reactions. *OH* is an hydroxyl group, an atom of oxygen and one of hydrogen associated together as one atom; $(COOH)_3$ indicates three carboxyl groups, in which the associated atoms are carbon, oxygen, oxygen, and hydrogen. The C_3H_4 indicates that the molecules of citric acid contain, besides the radicals, three atoms of carbon and four of hydrogen.

CITRON, a large, sour, lemonlike fruit, valued chiefly for its thick, tender rind. When preserved, it is used in cakes and candies; when fresh, it yields two perfume oils. The juice of the fruit is sometimes used with sugar, for a drink like lemonade, or to flavor various liquors. The citron tree, a native of India, has been a favorite in Europe since the days of the ancient Greeks, because of its handsome fruit and violet-colored blossom. In California and other warm parts of the United States, the plant is grown as an ornamental. It is very sensitive to frost. B.M.D.

Scientific Name. The citron belongs to the rue family, *Rutaceae*, and to the same genus as the orange and lemon (see CITRUS). Its botanical name is *Citrus medica*. The name citron is also applied to a preserving melon related to the watermelon.

CITRUS, a commercially important genus of fruit-bearing trees and shrubs, mostly spiny or thorny, including the orange, citron, lemon, lime, grapefruit, bergamot, and others. Citrus trees are natives of India and other warm parts of Asia, but most of them are now cultivated in other parts of the world, especially for their fruit. Citrus plants have rather long, pointed leaves or leaflets, united by a distinct joint to the leaflike stalk. They all bear pulpy fruits, with spongy rinds, and are valued as dessert, for preserves, or for cooling drinks. The leaves, the rind of the fruit, and the flowers all contain valuable volatile (easily evaporated) oils. See illustration, page 1437. B.M.D.

Related Subjects. The reader is referred in these volumes to the following descriptions of citrus fruits.

Bergamot	Lemon
Citron	Lime
Grapefruit	Orange
Kumquat	

CITY. If a child is called on to define a city, he will probably say that it consists of a lot of people living close to each other, whereas in the country people live farther apart; for the child does not, of himself, realize that it is the difference in *government* that makes the real distinction.

The Development of a City. Occasionally, a city springs into existence almost full grown. Thus Gary, Ind., had few of the transition stages which mark the growth of most cities; its founders knew that it was to become a busy manufacturing town, and they made their plans to that end from the beginning. But in most cases, the process is more gradual, and something like this takes place:

In any district, certain roads are bound to be more traveled than others. In time, some enterprising mechanic sets up an automobile repair shop or a filling station (in earlier days it was quite likely to be a blacksmith shop) at the point where two of these busy roads cross, and his success is so evident that a general storekeeper soon follows his example. Then, perhaps, a doctor chooses that location for his office and home, or a carpenter settles there. Slowly the little community grows, each new business or residence attracting others, but still the people are a part of the township, with no special needs, and no special public expenses.

Finally, the settlement is large enough to feel the need of a school. Better streets and sidewalks are necessities, if there is to be any social life, and there must also be street lights, and some better way of obtaining water than from wells. When the inhabitants of the little community bring such matters before the township authorities, they meet with instant rebuff: why should the people living two or more miles from this corner settlement let themselves be taxed to confer benefits on these favored few?

In other words, if the settlement wants these improvements, it must pay for them. Under the laws in all states and provinces, such a community may be incorporated as a village. Then it may elect its own officers, raise its own funds, and establish its own local laws, provided it does not overstep those of any higher authority. From this time on, the change is one of degree only—the village becomes a city, and must have a new charter, but its purposes and methods are those of the old village on a larger scale.

The number of people who may incorporate as a city varies in each state and province, but the minimum is usually 1,000, though sometimes it is as high as 5,000. Villages containing the required number of inhabitants usually make the change because larger powers are granted by the state or province to borrow money for pavements, sewers, street lighting, and other public works, and also because the usual division of a city into wards is thought to give all portions of a community a fair share in the government. A third reason is that every community is eager to proclaim its growth. A village ordinarily becomes a city by adopting a city *charter* (which see). In most states and provinces, the legislatures have passed acts providing uniform requirements for the incorporation of cities, but in a few they must consider separately each application for a charter. It is noteworthy that the city or ward system is not favored by all, as is shown by the fact that Brookline, Mass., for example, though it has over 40,000 people, is still a village. On the other hand, Harrison, Mich., with 399 people in 1920, is a city with three wards.

Officers. Under the usual form of city government, the chief executive officer is the mayor. Other officers are a city clerk, treasurer, and assessor, all elected. The city council,



CITRUS FRUITS

From left to right: lemon, grapefruit, lime, orange.

Photo: St. Clair

which is the legislative body, is usually composed of a single chamber, with one or two aldermen from each of the wards into which the city is divided. With the approval of the council, the mayor appoints the heads of various executive departments, including the chief of police, the fire marshal, the superintendent of public works, and the board of education. A system of city courts is operated by elected judges. Since the beginning of the twentieth century, several types of city government have been developed which somewhat resemble village government. Among these are the *city manager plan* and the *commission form of government*, both of which are described in these volumes.

[The accompanying outline considers the city in all its phases—its geography, its government, and its history. It may be necessary to make occasional changes to meet local conditions, but in the main it will answer all needs.]

Fifty Largest Cities of the World. Even in ancient times, very large cities were numerous. Thebes, Memphis, Babylon, Nineveh, Carthage, Athens, Rome—all were great cities. Baghdad, Damascus, and Cairo were flourishing cities in the Middle Ages, and by 1500 there were in Europe at least half a dozen cities each with a population of over 100,000. Then, as now, there was a tendency for people to congregate in the capitals. In the following table of the largest cities in the world to-day, twenty-seven, or two more than one-half, are state, provincial, or national capitals.

FIFTY LARGEST CITIES OF THE WORLD

Latest official figures or estimates

1. London, 7,742,212	26. Melbourne, 912,130
2. New York, 6,017,500	27. Montreal, 907,500
3. Berlin, 4,013,588	28. Canton, 900,000
4. Chicago, 3,157,400	29. Mexico City, 900,000
5. Paris, 2,871,420	30. Constantinople, 880,000
6. Buenos Aires, 2,741,007	31. Milan, 877,424
7. Osaka, 2,114,804	32. Liverpool, 856,000
8. Philadelphia, 2,064,200	33. Naples, 852,362
9. Moscow, 2,018,286	34. Saint Louis, 848,100
10. Tokyo, 1,995,567	35. Baltimore, 830,400
11. Vienna, 1,865,780	36. Brussels, 801,656
12. Leningrad, 1,611,102	37. Tien-tsin, 800,000
13. Hankow, 1,583,900	38. Boston, 799,200
14. Shanghai, 1,500,000	39. Madrid, 791,511
15. Detroit, 1,378,900	40. Cairo, 790,939
16. Budapest, 1,217,325	41. Manchester, 760,000
17. Bombay, 1,175,504	42. Rome, 758,569
18. Rio de Janeiro, 1,157,873	43. Bangkok, 750,000
19. Calcutta, 1,132,246	44. Barcelona, 745,711
20. Peking, 1,100,000	45. Amsterdam, 718,046
21. Glasgow, 1,052,200	46. Cologne, 698,064
22. Sydney, 1,039,390	47. Munich, 680,704
23. Cleveland, 1,010,300	48. Leipzig, 679,322
24. Hangchow, 1,000,000	49. Pittsburgh, 673,800
25. Warsaw, 931,176	50. Dresden, 618,684

Los Angeles, Calif., belongs in this list, in position probably between 24 and 26, but so rapid has been its

growth since 1920, when its population was 576,673, that the Census Bureau has not ventured an estimate.

Fifty Largest Cities in the United States. In the United States, contrary to the general rule in Europe and other parts of the world, the largest cities are rarely capitals. In Europe the cities often became largest because they were capitals. In the United States, on the other hand, the state capitals are usually centrally located in the state, whereas the location of the largest cities is determined by advantages of position with regard to commerce and industry. In the following table one city, Washington, D. C., is the national capital and nine are state capitals.

FIFTY LARGEST CITIES IN THE UNITED STATES

From government estimates or state census

1. New York, 6,017,500	27. Denver, 294,200
2. Chicago, 3,157,400	28. Providence, 286,300
3. Philadelphia, 2,064,200	29. Oakland, 274,100
4. Detroit, 1,378,900	30. Portland, Ore., 258,288
5. Cleveland, 1,010,300	31. Atlanta, 255,100
6. Los Angeles (uncertain)	32. Saint Paul, 234,698
7. Saint Louis, 848,100	33. Omaha, 222,800
8. Baltimore, 830,400	34. Birmingham, 222,400
9. Boston, 799,200	35. San Antonio, 218,100
10. Pittsburgh, 673,800	36. Dallas, 217,800
11. San Francisco, 585,300	37. Akron, 208,435
12. Buffalo, 555,800	38. Syracuse, 199,300
13. Washington, 552,000	39. Worcester, 197,600
14. Milwaukee, 544,200	40. Richmond, 194,400
15. Newark, 473,600	41. Memphis, 190,200
16. Minneapolis, 455,900	42. New Haven, 187,900
17. New Orleans, 420,100	43. Dayton, 184,500
18. Cincinnati, 413,700	44. Norfolk, 184,200
19. Kansas City, 391,000	45. Hartford, 172,300
20. Seattle, 383,200	46. Fort Worth, 170,600
21. Indianapolis, 382,100	47. Grand Rapids, 164,200
22. Louisville, 329,400	48. Des Moines, 151,900
23. Rochester, 328,200	49. Springfield, 149,800
24. Jersey City, 324,700	50. Scranton, 144,700
25. Toledo, 313,200	
26. Columbus, 299,000	

The Largest Cities in Canada. The figures given in the following table of the largest Canadian cities are from the census of 1921, except as noted. There are sixty-two cities or towns each with over 8,000 inhabitants. It is interesting to note that eight of the first fourteen cities are capitals, and that Fredericton, N. B., is the only one of the nine provincial capitals which does not appear in the complete list. It is also a striking fact that the total population of these sixty-two Canadian cities does not equal that of the second city in the United States.

When it is realized that until 1867 the Dominion of Canada was not organized, and that for a quarter of a century thereafter the great West was a wilderness, the growth of the cities is remarkable. There are towns of 100,000 and more in the West that were small villages a comparatively few years ago.

- | | |
|--------------------------|--------------------------|
| 1. Montreal, 907,500* | 34. Moncton, 17,488 |
| 2. Toronto, 521,893 | 35. Glace Bay, 17,007 |
| 3. Winnipeg, 191,356† | 36. Stratford, 16,094 |
| 4. Vancouver, 117,217 | 37. Saint Thomas, 16,026 |
| 5. Hamilton, 114,151 | 38. Lachine, 15,404 |
| 6. Ottawa, 107,843 | 39. Brandon, 15,397 |
| 7. Quebec, 95,193 | 40. Port Arthur, 14,886 |
| 8. Calgary, 65,513† | 41. Sarnia, 14,877 |
| 9. Edmonton, 65,163† | 42. New Westminster, |
| 10. London, 60,959 | 14,495 |
| 11. Halifax, 58,372 | 43. Chatham, 13,250 |
| 12. Saint John, 47,166 | 44. Galt, 13,216 |
| 13. Victoria, 38,727 | 45. Saint Boniface, |
| 14. Windsor, 38,591 | 12,821 |
| 15. Regina, 34,432 | 46. Charlottetown, |
| 16. Brantford, 29,440 | 12,329 |
| 17. Nanaimo, 29,088 | 47. Belleville, 12,206 |
| 18. Saskatoon, 25,739 | 48. Owen Sound, 12,190 |
| 19. Verdun, 25,001 | 49. Oshawa, 11,040 |
| 20. Hull, 24,117 | 50. Lethbridge, 11,097 |
| 21. Sherbrooke, 23,515 | 51. Saint Hyacinthe, |
| 22. Sydney, 22,545 | 10,850 |
| 23. Three Rivers, 22,367 | 52. North Bay, 10,692 |
| 24. Kitchener, 21,763 | 53. Shawingan Falls, |
| 25. Kingston, 21,753 | 10,625 |
| 26. Sault Sainte Marie, | 54. Lévis, 10,470 |
| 21,092 | 55. Brockville, 10,040 |
| 27. Fort William, 20,541 | 56. Woodstock, 9,935 |
| 28. Maisonneuve, 19,886 | 57. Medicine Hat, 9,634 |
| 29. Saint Catharines, | 58. Valleyfield, 9,215 |
| 19,881 | 59. Joliette, 9,113 |
| 30. Peterborough, 19,477 | 60. Orillia, 8,744 |
| 31. Moose Jaw, 19,285 | 61. Welland, 8,654 |
| 32. Guelph, 18,128 | 62. Sudbury, 8,621 |
| 33. Westmount, 17,593 | |
| *1925 †1926 | |

Related Subjects. The reader is referred in these volumes to the following articles:

City Manager	Commission Form of Government
City Planning	Common Council

CITY MANAGER, an official employed by the governing body of a city to manage its business affairs. This is a recent modification of the commission plan of government (which see). Under the city-manager plan, there is a small elective commission, but this body does not itself exercise administrative powers. Instead, the commission appoints, and discharges at its pleasure, a city manager.

The city manager is held responsible for the management of the city's business, which he is expected to conduct as he would a private enterprise, aiming to secure the best results with the least expenditure of public funds and the highest degree of efficiency. In most cases he has authority to employ and discharge helpers and minor officials. The city-manager plan has been found to be of great value, since it removes public service from politics, and frees the municipality from the evils attending the system of filling offices to pay political debts. More than 400 American cities have adopted the city-manager plan, the largest being Cleveland, O.; a few have abandoned it after trial. Several universities have added courses for training men to become city managers. See **MUNICIPAL GOVERNMENT**.

OUTLINE FOR A CITY

I. Map of City, Showing Principal Streets, Location of Principal Buildings, Waterways, etc.

II. Description

- (1) Area and population
- (2) Location
 - (a) In township
 - (b) In county
 - (c) In state
 - (d) Directions from other cities
- (3) Surroundings
 - (a) Suburbs
 - (b) Beauty spots

III. Government

- (1) Chief executive
 - (a) Title
 - (b) How chosen
 - (c) Length of term
 - (d) Duties
- (2) Other elective officers
 - (a) Financial
 - 1 Treasurer
 - 2 Assessor
 - 3 Collector of taxes
 - (b) Clerk
 - (c) Fire
 - (d) Police
 - (e) Judicial
- (3) Appointive officers
 - (a) Health
 - (b) Education
 - (c) Parks
 - (d) Streets
 - (e) Water supply

IV. Education

- (1) Board of education
- (2) Superintendent of schools
- (3) Public schools and buildings
- (4) Private institutions
 - (a) Kinds
 - (b) Endowments

V. Public Utilities

- (1) Rail and water communication
- (2) Street railways
- (3) Water supply
- (4) Lighting system, how owned
 - (a) Electric light
 - (b) Gas

VI. Parks and Boulevards

- (1) Parks
 - (a) Number
 - (b) Area
 - (c) How controlled
 - (d) How supported
- (2) Boulevards
 - (a) Extent
 - (b) Special rules governing

VII. Commerce and Industry

- (1) Banking strength
- (2) Manufactured articles
 - (a) Kinds
 - (b) Market
 - (c) Annual value
 - (d) Persons employed in manufactures
 - (e) Wages paid annually

VIII. Study of Charter

IX. History

- (1) When settled
- (2) Date of organization as a village
- (3) Date of change to city government
- (4) Notable events
- (5) Persons more than locally known

CITY PLANNING. The purpose of city planning is to provide for the business interests, residences, parks, boulevards, and the means of transportation, and to do this in such a manner as will make the city convenient, sanitary, and beautiful. Most cities have grown from small villages by successive additions, and have not followed any plan of development which has taken all interests into consideration. It is not practicable to remedy much that has been done, but many large cities now have city-planning commissions, which have oversight of new works and can prevent a repetition of mistakes of the past. In some parts of Europe, city planning has received attention for many years.

A complete plan for the city of Washington was made by the French architect, L'Enfant, but it has not been strictly followed until recently. The national commission appointed to take charge of the beautifying of that city was headed by Daniel Hudson Burnham (which see), who collaborated with McKim, Olmsted, and Saint Gaudens. Canberra, the new capital of the Commonwealth of Australia, is being built after a complete plan furnished by Walter B. Griffin, an American. Tokyo sought the advice of American and European experts on city planning before beginning to rebuild after the earthquake in 1923.

Zoning System. Not until a few years ago was there denial of the old doctrine that a man may do as he pleases with his own property, regardless of the wishes of his neighbors. This idea has controlled the development of cities. The owner of a vacant lot adjoining fine homes might erect on it a public garage or a machine shop, thus forcing an objectionable business enterprise into the midst of residential calm. Constant encroachment of this kind at length forced people to defend their rights. Aggrieved home-owners, on appeal to the law, have been protected, and objectionable enterprises in residential districts have been classed as nuisances to be abated. Thus began the movement for what is known as the zoning system for growing cities.

No longer is unrestricted license the rule in building in any section of large cities. Under zoning laws, a city is divided into districts, each district being set aside for one particular line of development. Certain sections are designated as purely single-residence areas; others quite as desirable are allotted to apartment houses, without, however, excluding individual homes; office buildings are appropriately placed; factory sections are located, and no factory may encroach upon residence zones. Billboards may be confined to areas where their presence will not mar landscape effects. The zoning plan has extended in over sixty cities to include control of the erection of buildings, to determining of what material they shall be

constructed in certain sections, and in business zones to declaring what their maximum heights shall be, thus assuring the proper amount of light, air, and sunshine to the neighborhood.

Zoning illustrates the developing social sense of a community. It also emphasizes the belief that there should no longer be unrestrained individualism, but that the interests of the whole body of people should be regarded as paramount to the rights of its individual members.

[This new idea of controlling municipal growth in America originated in New York in 1911. Over 500 cities now have zoning ordinances. The United States Department of Commerce has prepared a Standard Zoning Act, drawn by its Advisory Committee on Zoning, which is so comprehensive that it has become the pattern for local acts in all parts of the country.]

Garden Cities. The unprecedented growth of cities to include over half the population of the United States is the outstanding result of the nation's industrial development. It is proper to inquire whether this city growth has not cost more than would have been the case had it been properly directed.

When cities were small, the cottage homes had a generous allotment of land. Privacy, quietness, and contentment were everywhere the rule; slums were unknown, and the open country, with its wild flowers and tempting vistas, was only a few blocks away. People knew and enjoyed their neighbors; they were living a sane and happy life.

Then came a great increase in population, and the city spread over the country, swallowing up whole villages. The pretty cottages, with their ample grounds, have been replaced by houses and apartment buildings, erected so close together that all privacy and gardens have well nigh vanished.

The short but pleasant walk to the office or workshop has been replaced by a tedious street-car ride, during which, perchance, one hangs to a strap and is jostled by an unfeeling crowd of citizens just as unfortunate. These are the conditions in most modern cities.

Then there is the traffic problem of fast-growing communities, a problem that increases as the square of population, so that when a city has twice the population, the traffic will be four times as great as now. It can easily be seen that the great city no longer furnishes the best conditions for a safe and happy life, nor does the future give promise for betterment. Instead of boasting of a city's enormous growth, the thoughtful man will be filled with chagrin and dismay.

A Proposed Remedy. There is but one real remedy; that is, the decentralization of industry and population, all other suggested remedies being simply palliatives which only postpone the real remedy. What is needed is the moving of

factories from the great cities to the small towns and villages in country districts, or better still, the founding of a *garden city*.

In such a new locality, industry will secure abundant cheap lands for both present and future needs, and more important still, the improved living conditions will give a more stable and contented labor supply. Employees will gain lower rents, better houses, less sickness, and more hours for leisure and recreation. Thus the entire community gains.

The English Garden City. The finest example of a garden city, now twenty-four years old, is at Letchworth, England. The English define a garden city as follows: "A self-contained town, industrial, commercial, agricultural, and residential, planned from the beginning as a whole and occupying land sufficient to provide garden-surrounded homes for from 35,000 to 50,000 people, as well as a wide belt of open fields." It combines the advantages of city and country, and ensures the permanency of both.

The garden city aims at the following accomplishments:

- (1) The establishment of the principle of business administration in the organization and management of a well-nigh ideal community
- (2) The making of a cooperative enterprise the controlling factor in the business success of home and community building
- (3) The elimination of parasitic enterprise from the business of home and community building
- (4) The development of a scheme of community planning that will do away with the evils of intensive urbanization.
- (5) In short, the building of a town full of the romance of modern progress in the art of living

These results are accomplished by means of the following steps:

- (1) A cooperative stock company is organized, and 4,000 to 6,000 acres of land is purchased at its agricultural value; (2) expert town planners and architects then design and construct a complete city, providing homes for all classes of people; (3) provisions are adopted which will prevent overcrowding the land with houses, and the houses with people; (4) factory districts are allocated with reference to the health and convenience of the people, as well as to sidetrack facilities for factories; (5) a belt of agricultural land is permanently reserved in the out districts, to be intensively cultivated in the form of allotment gardens; (6) dividends on capital are limited to 5 or 6 per cent, and the expenses of the town are chiefly met from the revenue of the land and house rents, both, from an American standpoint, being surprisingly low.

The company in the first place maintains the full control of the development of the town and adopts a system of land tenure which ensures that all increase in the value of the land shall benefit those who create it. That

the unearned increment in real-estate values of a growing community should go to those who create it is not a doctrine calculated to please land subdividers and land speculators, but that its application in a "garden city" like Letchworth has resulted in cheap rents and exceptionally low local taxes to all its 20,000 citizens, admits of no doubt.

But a true garden city like Letchworth is not simply an ideal place of residence; it is also fast becoming an ideal industrial city, with over fifty firms, many of which have removed from some large city, like London.

It is not claimed that all of the features of the English garden cities can be incorporated in an American garden city, for American customs and laws regarding land tenure, home ownership, etc., will require some changes to make them fit American conditions. That many of the desirable features of English garden cities can be used in new industrial towns admits of no doubt, and if so incorporated, it is very clear that such towns would greatly accelerate the decentralization of industry, so much needed to improve the conditions of large cities.

L.S.S.

CITY OF THE STRAITS, a popular name applied to Detroit, Mich. (which see).

CITY STATES, those states in which political life and political control are centered in a single city, which has all the powers of a self-governing nation, and exercises supreme authority over such territories as it may control. The city state had its fullest development in ancient times, the most conspicuous examples being Athens and Rome. The Athenian state consisted of Athens proper, and also the various outlying villages of the Attic territory; the free inhabitants of this territory owed allegiance not to Attica but to the city of Athens, and were, properly speaking, Athenian citizens. The ancient city state was, in territory, identical with a modern city; in political rights, it was identical with a modern nation.

In the Middle Ages, the Italian cities of Milan, Florence, Genoa, Venice, and Naples rose to power as independent states; the free cities of Germany, Hamburg, Bremen, and Lübeck are present-day examples of the city state in a modified form. See GREECE (History); ITALY (History: Period of City States).

CIVET, *siv'et*, a beautiful and valuable animal of the warmest regions of the Old World, chiefly Africa and the Malayan Islands. About two or three feet long and ten inches high, it is more slender than a raccoon, and has a long tail. The fur, gray above and white below, is tinged with yellow and marked by dusky spots in rows. Civets live in holes, like foxes, and eat birds and other small animals. They are also fond of crocodile eggs, and are considered valuable along the Nile because they prevent the too rapid increase of the crocodile family.

Most of all, however, civets are valued for a fatty substance with a musky odor, which is taken from pouches connected with the genital organs, and used for making perfumes. Only a few drops are taken each week from one animal. London imports thousands of ounces each year.

The American civet cat, so called, is not a true civet. With the mongooses (see MON-GOOSE), the civets form a distinct family among the numerous carnivorous animals. M.J.H.

Scientific Name. Civets constitute a genus of the family *Viverridae*. The common civet of Africa is *Viverra civetta*.



THE CIVET

Photo U & U

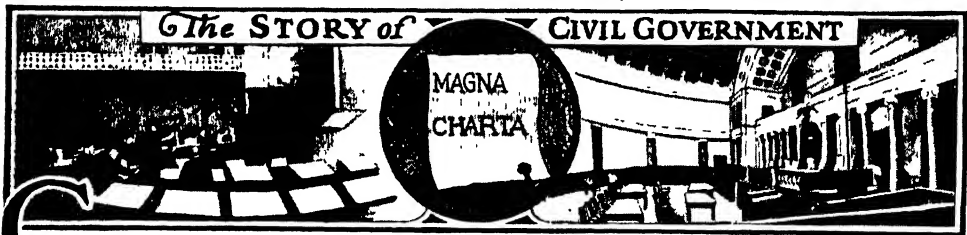
CIVIC FEDERATION, NATIONAL, an organization of prominent employers, labor leaders, and public men, formed in 1901 for the purpose of settling and preventing labor disputes and strikes. The association grew rapidly and now includes nine departments, the most important of which is probably that for preventing and settling strikes; others wherein good work has been done are the welfare department, the woman's department, the social-insurance department, and that for preventing accidents to employees and securing compensation for those who are

injured. Each department is in charge of an executive committee whose members represent the public, the employees, and the employer. Headquarters are maintained in New York.

CIVICS. See CIVIL GOVERNMENT.

CIVIL DEATH. According to law, a person may be alive and enjoying good health, and still, under certain conditions, be dead to all his civil rights. In some states, as New York, this is true of one sentenced to the state prison for life; all his civil rights are taken from him, and to the world he is as dead. In all states, absence for a specified time without any knowledge of the whereabouts of the

individual renders him legally dead to his civil rights; this period in most states is seven years. Supposing A, living in Wisconsin, should leave his home and family and go to Alaska. If at the end of seven years no word has been received from him, the law assumes him to be dead; his estate can be settled by probate, provided the family consents, and his wife may legally marry again. Should he afterward return, he could not compel the court to restore his estate or family; these are legally forfeited, beyond all redress.



CIVIL GOVERNMENT, in the widest sense, is the administration of the public affairs of a country, a state, or a smaller political unit. Civil government indicates "a state of society reduced to order and regular government," as distinguished from a barbarous or savage state. The simplest definition of the term is *citizen government*, for *civil* is from *civis*, meaning *citizen*.

Principles of Civil Government. Although there is great variety in the principles and methods of government in different countries, there is a general similarity in the organization of the central, or national, government. The great departments of the government—state, or foreign affairs; treasury, or finance; postoffice, etc.—are under the direction of Cabinet members who are either the chief advisers of the executive, as in the United States, or are themselves the real executives, as in

Canada and Great Britain. In the latter countries, the Governor-General and the head of the royal house are the executive heads, but their authority has been greatly lessened during the years that democracy has been gaining strength.

In local and internal affairs, the government organizations are as varied as the political ideals of the nations. It is generally true that in those countries in which feudalism left its strongest marks, the government is most highly centralized, whereas in countries which have partly emancipated themselves from feudal tradition, decentralization is noticeable. No modern civilized state, however, is either wholly centralized or wholly decentralized. Centralized government, according to the popular view, is most advantageous when it deals with national affairs. Decentralized control in international relations, or in the army or

navy, for example, would be disastrous. It would seem absurd to-day if each of the states of the American Union or the Canadian provinces had independent diplomatic relations with foreign countries. On the other hand, decentralization is helpful in dealing with local affairs. It makes the government quickly responsive to public opinion, whereas a centralized government tends to disregard criticism and to become mechanical in its attention to details.

Civics, the Study of Civil Government. The study of civil government, or of civics, as it is now generally called, is one of the modern branches of school instruction. As early as 1869, an attempt was made to introduce the subject in American schools, but at that time it was thought that a knowledge of the framework of government, as outlined in the Constitution, was the only thing needed. To-day the study of civics includes not merely the machinery of government, but an investigation of its actual workings, particularly as they affect the individual citizen. The duties of a citizen toward the government are as much a part of civics as the duties of the government toward the individual. Civics is still taught to a considerable extent in connection with history, but in addition to its historical side, teachers now emphasize the practical, present-day value of this subject. The fundamental purpose, after all, is to make better citizens—a result which can be hastened by teaching children both the theory and the operation of government.

Related Subjects. The numerous articles on civil government which these volumes contain are here listed. For ease of reference they are classified

EXECUTIVE

Agriculture (Department of)	Imperator
Ambassador	Interior, Department of
Assessor	of the
Attaché	Kaiser
Bureau	Khan
Cabinet	Khedive
Census	King
Chargé d'Affaires	Labor, Department of
Civil Service	Legate
Commerce, Department of	Lieutenant-Governor
Consul	Majesty
Crown	Mikado
Czar	Ministers, Foreign
Dauphin	Mint
Dead-Letter Office	Navy, Department of
Dictator	the
Diplomacy	Pardon
Divine Right of Kings	Postoffice Department
Doge	Premier
Education (Bureau of Education)	President of the United States
Electoral College	Prince
Emperor	Privy Council
Exchequer, Chancellor of the	Queen
Executive Governor	Rajah
Governor-General	Regent
	Royal Canadian Mounted Police
	Secret Service
	Sheik

State, Department of	Veto
Sultan	Vice-President
Supremacy, Royal	War, Department of
Theocracy	Weather Bureau
Treasury	

LEGISLATIVE

Amendment	Junta
Burgesses, House of	Legislature
Civil Law	Lobby and Lobbying
Committee of the Whole	Local Option
Common Council	Parliament
Congressional Record	Pure-Food Laws
Congress of the United States	Reichstag
Delegate	Senate
Diet	Senate of the United States
Duma	Short Ballot
Equity	Speaker
Initiative and Referendum	Statute
	Zemstvo

JUDICIAL

Admiralty	Justice, Department of
Attorney-General	Justice of the Peace
Chancellor	Juvenile Court
Claims, Court of	Morals Court
Courts	Probate
Equity	Supreme Court of the United States
Judge	

LOCAL

Alderman	Fire Department
Burgomaster	Garbage
Canton	Mayor
City Manager	Municipal Government
City Planning	Municipal Ownership
Commission Form of Government	Police
Commune	Poll Tax
Constable	Selectmen
Coroner	Sheriff
County	Town Meeting

GENERAL

Alien	Law
Annexation	National Debt
Australian Ballot	Naturalization
Autonomy	Oligarchy
Ballot	Passport
Caucus	Primary Election
Citizen	Privy Seal
Civil List	Province
Conservation	Recall, The
Constitution	Registration
Constitution of the United States	Republic
Customs Duties	Revenue Cutter
Election	Seal
Electoral Commission	Single Tax
Empire	Sovereignty
Exterritoriality	Squatter Sovereignty
Flag	Stamp
Forests and Forestry	State
Franking Privilege	Subsidy
Free Trade	Suffrage
Government	Tariff
Imperialism	Tax and Taxes
Income Tax	Territory
Inheritance and Inheritance Tax	Toll
Internal Revenue	Treaty
Land, Public	Voting Machine
	Woman Suffrage

CIVILIAN TERRITORY. See TIMBUKTU.

CIVIL IMPRISONMENT, imprisonment through civil processes, such as failure to pay alimony, or to obey the mandates of a court.

CIVILITY, a condition of society which recognizes relations and duties of citizenship.



CIVILIZATION, *siv ih li za' shun*. The development of civilization is one of the most interesting of the world's stories. It is one in which everybody has a part, and the sooner each one learns to play his part well, the sooner each will enjoy the fruits of a perfect civilization. The story is a long one. It has been in the making upwards of 100,000 years, yet Emerson tells us that we are only "in the cock-crowing and the morning-star." It is divided into three parts, *savagery*, *barbarism*, and *civilization*, and each of these parts is likewise in three parts, known as *lower*, *middle*, and *higher* savagery, barbarism, and civilization.

The best thinkers and the best workers of savagery paved the way to barbarism; and the best thinkers and the best workers of barbarism paved the way to civilization. And if we are to have a better civilization, we must have boys and girls and men and women who are willing and able to be good thinkers and good workers.

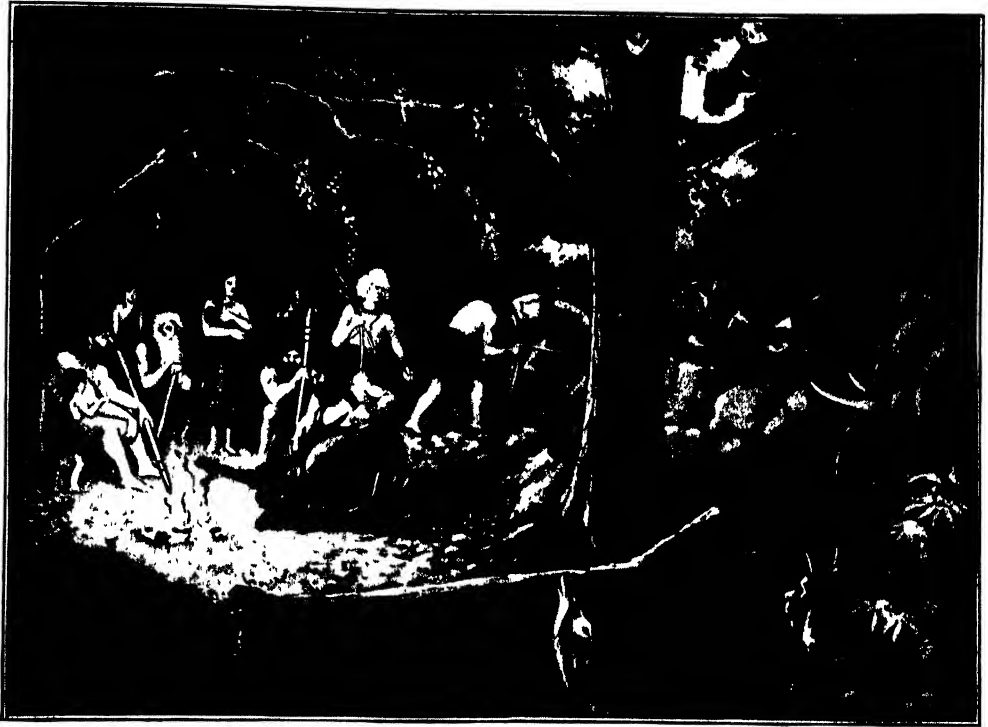
Lower Savagery. Man in lower savagery was not aware of doing anything for people who were to live after him. In fact, it was all he could do to supply the needs of the day. He was without tools, without weapons, without fire, without the experience of working with others, and almost entirely dependent upon his own efforts. In many respects, Nature was kind to him. She placed him in a mild climate and in a region surrounded with wild plant foods. But there was danger on every hand, and he was filled with fear. The saber-toothed cat, the fiercest beast of prey ever known, made his home in the neighboring caves; cave bears, tigers, wolves, and hyenas lurked in the thickets; hippopotamuses and rhinoceroses wallowed in the marshes and splashed in the rivers and lakes; wild cattle, horses, bison, and other grass-eating animals fed on the hillsides and on the grassy plains.

The safest place of refuge for man was in the branches of the tall trees. He was not able to cope with the wild beasts. Most of the animals were stronger than he and were specially fitted for the fierce struggle for existence; man alone in the animal kingdom was not provided with adequate means of attacking the wild

beasts or protecting himself from their attacks. He was not like the tiger, that could tear and rend with its sharp teeth; he was not like the rhinoceros, that could trample one under its feet; nor was he like the wild horse, that could strike hard blows with its hoofs. It would thus seem that man was not intended for fighting, but for work of a different kind, and we find that even the lowest savage was truly fitted for a different kind of work. In certain respects he was superior to any of the wild beasts. No wild beast was able to *think*, as man could think; no beast could *do as many things* as man could do; no wild animal gave its young training and care for so long a time as the savage did. Man, in lowest savagery, thus stands out from the brute world on account of the fact that he is a "thinking animal" who educates his young for a long period. Nature soon gives the young animal skill of its kind, but the young child needs training as well as protection for several years.

Had the lowest savage known enough, he might have established civilization through the exercise of the characteristics which distinguish him as man and separate him from the beasts. But he did not know enough to do it. The story of civilization is the story of how he learned to do it. The earliest chapters tell how he used intelligence at first in fighting the wild beasts and in taking what he needed without thought of giving anything in return. He was destructive because he was ignorant. It is no wonder that he remained in savagery tens of thousands of years. He did make some progress, however, and we all owe him a debt of gratitude, for it was man of lowest savagery who first conquered fire.

Before the conquest of fire, man undoubtedly saw many forest fires, which may have been kindled by lightning. It was a brave man who first dared venture near the fire-monster. And undoubtedly it was the desire to gain the good will of the fire-monster that led to the practice of "feeding the fire" by piling sticks upon it. At any rate, we know that the savage worshiped the fire, just as he worshiped the powerful and much-dreaded beasts of prey that were a constant menace to him.



HIGHER SAVAGERY UNKNOWN AGES AGO

Man soon found out that fire was an invaluable ally. When he had fire at the foot of a tree, wild animals kept away from the spot. He was thus able to come down from the branches and make his home at the foot of a tree. Other tree-dwellers, seeing and hearing something about it, were curious, and one by one they came to the spot, and they soon formed a clan. The fire needed attention, so quite naturally the women with little children stayed near the fire, while the men went farther away in their search for food. When these men returned from an exciting hunt, they were eager to tell the women about it. Not having a well-developed language, they gathered around the fire and acted out the story of the hunt, and thus invented the dance, which embodied music and poetry.

Little by little, it was found that fire could be used in hunting, in making weapons, and in cooking. Each of these discoveries was the result of thinking; each made the struggle for existence a little easier than it had been before. The conquest of fire thus marks the entrance of man from lower to middle savagery.

Middle Savagery. The story of middle savagery is the story of how man, armed with fire, took possession of the caves; how, thus protected, he had more leisure and was able to make better weapons; how people learned to work together; how they gained courage

to meet the wild beasts in open combat; and how, when they learned to cook fish, they became free to wander up and down the streams throughout the greater part of the world. This age has been called the *rough stone age*, because of its rough stone weapons. Among these the stone ax and the spearhead are the most characteristic forms.

Higher Savagery. In lower savagery, man was afraid of wild animals; in middle savagery he gained courage to meet them in open combat; in higher savagery, his courage grew and he invented weapons he could hurl through the air faster than the swiftest animal could run. It was then that the animals became afraid of man. At first, weapons were thrown from the hand. Then a throwing stick was invented, and finally there appeared that epoch-making invention, the bow and arrow.

It was during this period that *tools* were made, as distinct from *weapons*. Among these were knives, files, saws, and needles. The invention of tools made it possible to use unshaped material such as bone, horn, and ivory in the manufacture of weapons. Many such weapons, with beautifully carved handles, were made by the reindeer hunters of Western Europe during the Glacial Epoch (which see).

During higher savagery, man had some animal pets, but no animal except the dog was really domesticated. The dog proved to be



IN THE PERIOD OF HIGHER BARBARISM

a great aid to man, not merely in hunting, but in the domestication of the grass-eating animals in a later time.

Lower Barbarism. The invention of pottery, which gave man permanent cooking utensils that could withstand the heat, was the dividing line between savagery and lower barbarism. Previous to this, cooking was a tedious process, and consequently much food was eaten in a raw or partially cooked state. But with permanent cooking utensils that could be carried from place to place, the custom of serving well-cooked foods became established; and man, being better fed, was not so irritable as he was in savagery, when he was likely to gorge in times of plenty and go hungry in times of famine.

The domestication of animals and the cultivation of plants mark the greatest change in man as he passed from savagery to barbarism. The savage, we have seen, was content to take Nature's gifts, with no thought of giving anything in return. Such destructive methods resulted in exhausting the hunting grounds; and so gradually the women learned to sow seeds and make little gardens and to raise the young animals brought home from the hunt. They began to learn to protect the plants in return for their fruits; they found that the care they gave to their animal pets was repaid in times of famine by milk or meat.

Middle Barbarism. In this period we find a more extended practice of agriculture, carried on not merely by the women, but by men who were captured in warfare. In many places it was found that the grass-eating animals, when protected from enemies, multiplied very rapidly; so men as well as women took up the work of domesticating animals, and they soon had large flocks and herds. Man thus learned to be more sympathetic toward the grass-eating animals and toward the people of his clan, but he still regarded strangers as enemies, and enjoyed nothing better than making a raid on neighboring tribes and driving away their flocks.

It was during this period that animals were first used for carrying burdens and also as draft animals; and as life became more settled, better dwellings were erected, adobe brick coming into use at this time (see ADOBE).

Higher Barbarism. The discovery of how to smelt iron ore and fashion it into tools and weapons is the great discovery which characterizes the period of higher barbarism. The use of iron made it possible for people to have better tools and weapons and to progress at a far more rapid rate than before. Forests could be cleared with the iron ax, and many forests were soon transformed into arable land and meadows. With the division of labor and development of trade, cities grew up. Here the

HOMES THROUGH the AGES



In the Beginning



Living in Trees



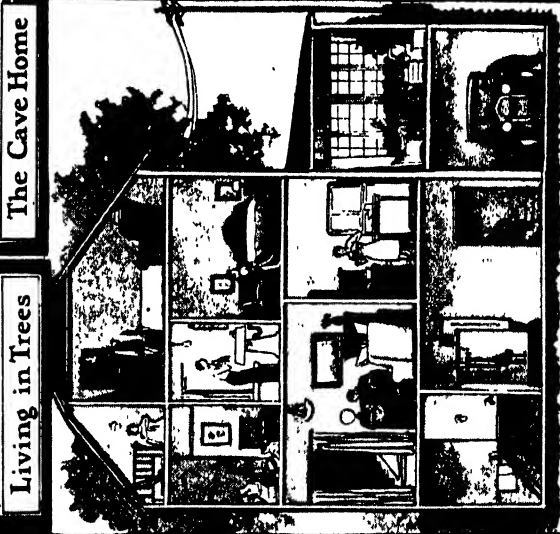
The Cave Home



A Rude Shelter



Primitive Wood Hut



Features of a Modern Home



An Adobe Home



Early Masonry



The Log Cabin



Modern Cliff Dwelling



Ancient Cliff Dwelling



ACTUALITIES OF MODERN CIVILIZATION

The genius of invention rivals the powers of Aladdin's lamp.

ruling classes lived, protected by stockades or walls, while slaves and serfs lived outside and cultivated the land. The Homeric Greeks, the early Italian tribes, the Germans of the time of Tacitus, and the Norsemen of the Viking age are examples of higher barbarian culture.

Lower Civilization. The discoveries and inventions of savagery and barbarism were worth so much to succeeding ages that the wise men and women who made these discoveries were deified as gods. It was not easy to hand down exact knowledge in the early ages. Stories were likely to be changed, and the picture writing of the savage and the hieroglyphics of the barbarian were clumsy ways of preserving records. With the invention of the alphabet, knowledge was more easily preserved. This invention has been made the dividing line between barbarism and civilization. Lower civilization covers a period extending from about 4000 to 5000 B.C. to the fifteenth century A.D. Ancient Egypt, Babylonia, Phoenicia, Carthage, Greece, and Rome are examples of this stage of culture. In these countries, labor was performed by slaves. The ruling classes looked down upon the slaves and upon slave labor. Progress was made by the upper classes in the arts and sciences, but no one applied this knowledge to the work of slaves, most of whom were captives of war.

Ancient civilizations were in constant fear either of uprisings on the part of the slaves and serfs or of being overrun by barbarian hordes. The invention of gunpowder wrought such a change in warfare that it marks the advance to middle civilization. The use of gunpowder enabled civilized peoples to protect themselves from barbarian hordes from without; and with the freeing of the slaves, it enabled the masses of the people to protect themselves from the oppression of the ruling classes, who lived in fortified castles or behind city walls.

Middle Civilization. While the use of gunpowder was "leveling down" the power of the mighty, the invention of printing was "leveling up" the intelligence of the people. The dense ignorance which had characterized the masses of the people began to disappear. Printing was a tremendous power in removing ignorance and prejudice. It began to draw people together and to arouse a desire for knowledge of other peoples and other lands. The mariner's compass in the hands of Columbus, who had learned from the Greeks that the earth is a sphere, made it possible for that brave man to locate the New World. A little later the bold Copernicus (which see) opened up a new world of knowledge. For the Copernican theory gave a satisfactory explanation of much

that had hitherto been unknown. "The cause of day and night, of climate, seasons, of the earth's velocity, weight, size, and shape, of latitude, longitude, the eclipses, the moon's phases, the exact length of the solar year, together with those wonderfully minute calculations tabulated in our almanacs and text-books on astronomy"—these were no longer mysteries.

Middle civilization began in the fifteenth century, and was brought to a close during the last years of the eighteenth by the application of steam power and machinery to the manufacture of cotton cloth. Fire told its secret to Watt, and Watt gave the world the steam engine. See WATT, JAMES.

Higher Civilization. Modern civilization has witnessed the triumph of mind over matter. Material obstacles which have so long separated men have been overcome. The task of this age is to remove the mental qualities which separate men. Fear, envy, jealousy, greed, and hate are among the "wild beasts" of to-day. And just as the savage set himself to the task of waging warfare upon the saber-toothed cat and other dangerous beasts, so many people to-day are setting themselves to the task of destroying the mental "beasts of prey." This is a warfare in which every girl and boy may take part; for every girl and

every boy can refuse to entertain these "wild beasts," and thus let them die of starvation. In this way, each of us can have a good part in the story of civilization. K.E.D.

CIVIL LAW, that code of law which governs man in his relations with his fellow man in civil life. The term is derived from the Latin *civis*, which means *citizen*, and does not deal with crime; the latter lies wholly within the province of criminal law. When the breaking of a law affects only the persons directly concerned, civil laws are invoked; when a crime menaces the right to life and protection, it is prosecuted under the criminal code. To illustrate: Should A buy a horse of B for \$150 and later discover the horse to be blind, when B had represented him as "sound," A might sue B for damages under the civil law; but should C break into A's barn and steal the horse, A would have him prosecuted under criminal law.

The first application of the term was to the code of laws compiled by the Roman Emperor Justinian, in A.D. 530. This became the foundation of the laws of many of the later nations of Europe.

Related Subjects. The reader is referred in these volumes to the following articles

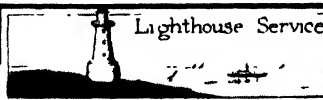
Common Law
Equity

Law
Justinian

The STORY of



Examinations



Lighthouse Service



Post Office and
Mail Service

CIVIL SERVICE



Printing

CIVIL SERVICE. The business of the United States government, not including the army and navy, is of such vast proportions that it requires over half a million employees of both sexes to conduct it. The government is by far the largest employer in the country. This extensive business embraces a great variety of occupations, some of which require only laborers, while others at the opposite end of the scale call for highly trained experts. This branch of service forms the *civil service* of the United States. The term means *citizen service*, as distinguished from the personnel of the army and navy.

Formerly, all these positions were filled by appointment at will by the President or his high subordinate officers, often at the solicitation of members of Congress. One of the

chief qualifications of an applicant for any position was his ability to influence votes for the party in power, but more especially for candidates for Senator or Representative in Congress from his district or state. In other words, government positions were granted as rewards for partisan political activity, and the fitness of the applicant to perform his required duties was too frequently a minor consideration.

Civil Service Law. Under this system of political appointments, the business of the government became so demoralized that Congress was compelled to institute reforms, and in 1883 the Civil Service Act was passed. The purpose of the act, as declared in its title, is "to regulate and improve the Civil Service of the United States."

Civil Service Commission. The law provided for the appointment by the President of three commissioners, a chief examiner, a secretary, and such other officers and employees as might be necessary. It was the duty of the commissioners to aid the President in making such rules as might be necessary to carry the act into effect. They now make all rules governing examinations and make an annual report touching upon the enforcement and effect of these rules.

Rules. The service is classified into departments known as departmental service, customs service, postal service, internal-revenue service, government printing, railway mail, pension, lighthouse, Indian schools, insular possessions, life-saving, etc. Because of this classification, the civil service has become officially known as the *classified service*. The Commission is required to make rules for filling positions in all classes of service by open, competitive examinations for testing the fitness of applicants, and for filling vacancies by selections among the successful candidates having the highest grades.

No person employed under the Civil Service Act is obliged to contribute service or money for political purposes. All employees may vote as they please, and have perfect freedom to express privately their political opinions; but they are forbidden to take an active part in political campaigns, or to use their official authority or influence to compel one to vote or to work for any candidate or measure.

Applications. One seeking to enter the classified service must file an application blank. The blanks for the departmental service at Washington, railway-mail service, Indian-school service, and the government printing service are obtained from the Civil Service Commission at Washington. The blanks for customs, postal, and internal-revenue classes may be procured from the civil-service board of examiners in the city where the examination is to be held. The Commission will mail to any person a list of cities in which examinations are to be held, with dates. The applicant must state specifically the class of service he wishes to enter, as stenographer, bookkeeper, clerk, etc.

Applicants must be citizens of the United States. The age limit varies for different classes of service, but it is not enforced against former members of the army and navy of the United States honorably discharged because of disabilities incurred while in active service. No discrimination is made because of sex, color, or political or religious opinions.

Examinations. Two examinations are held each year, and they are open to all persons qualified to enter the class for which the application is made. The examinations differ for each class of service. Full information con-

cerning them can be obtained from the Commission or the board of examiners.

Appointments. When a vacancy occurs, the highest three (in examination averages) of the sex called for are certified for appointment. In making this recommendation for the departmental service at Washington, the apportionment of employees among the states is considered. Appointments are made on six months' trial. If during that time the appointee proves his worth, his position becomes permanent. There are in all about 550,000 in the classified service of the United States, and naturally vacancies are numerous.

Exemptions. Officers appointed by the President and confirmed by the Senate are not under the civil service law. These officers may appoint private secretaries and other helpers whose services are of a personal nature, without subjecting them to examination, and they are not protected in their tenure of office.

State and City Civil Service. In most states the heads of departments, such as the secretary of state, state auditor, state treasurer, and superintendent of schools are elected by the people. Since each of these officers is usually empowered to appoint his assistants, there is not so good an opportunity for applying a civil-service law to state governments, though the general trend is becoming more satisfactory. Large cities afford excellent opportunity for the application of civil service.

Civil Service Reform. Attempts to improve the civil service are known as *civil-service reform*. Ever since its organization, the government of the United States has suffered more or less from the abuse of the appointing power of high officials. In 1832, in a debate in the Senate, Daniel Webster set forth the ideal which should be the aim in civil service. He said:

The theory of our institutions is plain, it is that government is an agency created for the good of the people, and that every person in office is the agent and the servant of the people. Offices are created, not for the benefit of those who are to fill them, but for public convenience.

When the government was organized, Washington and the members of his Cabinet exercised great care in appointing men to public office, and tried to secure those who were especially fitted for the duties to which they were appointed. Their example was followed by succeeding administrations, and for the first thirty-nine years under the Constitution, there were only 112 removals from office, each for good cause.

The Spoils System. With the inauguration of Jackson, there came a radical change in political methods (see JACKSON, Andrew). He removed from office not only heads of departments but all subordinates who had voted or worked against him in the campaign, and

filled their places with his followers. Thus was founded the *spoils system*, so called indirectly by Senator William Marcy of New York, who in a speech in the Senate, in 1832, laid down the principle that "to the victors belong the spoils of the enemy."

Each succeeding administration followed Jackson's lead, and a wholesale removal of office-holders on a change in the Presidency was taken by the country as a matter of course. At each change of administration, Washington was thronged by office-seekers—many of whom had the support of their Senators and Representatives in Congress. Parties were divided into factions, and thousands of incompetent men were appointed to positions of trust and responsibility, to satisfy political demands. See SPOILS SYSTEM.

The Merit System. Government business, under the spoils system, reached a deplorable state; thoughtful men began to seek a remedy, but it was a difficult matter to secure necessary legislation. In 1871 a bill was passed authorizing the President to make rules for admission to the civil service through competitive examinations, and to appoint a Civil Service Commission. President Grant appointed the Commission, and a system of examinations went into effect in the year 1872. This law continued in force for three years, when the political spoilsmen in Congress defeated the appropriation for the Commission, and it was obliged to abandon the work. The spoils system was again in operation for six years. In 1881 a quarrel over patronage in New York led to the assassination of President Garfield. Immediately public sentiment against the spoils system rose to such a high tide that the next Congress (1883) enacted the present law, described in detail above, the scope of which has been several times extended. The last extension, and one of the most important, was to include all postmasters of the fourth class (in the smaller offices) in the classified service. E.D.F.

Civil Service in Canada

The Canadian Civil Service Act is one of the most advanced pieces of legislation in civil-service affairs at present in existence. The establishment of the merit system in the Canadian Civil Service dates from the passing of the Civil Service Act of 1908, which applied the system of competitive appointment to certain positions at headquarters in Ottawa, and this was greatly enlarged by the Civil Service Act of 1918, which not only extended the field of competitive appointment to cover practically the whole service, but also provided for the reclassification and reorganization of all government departments under the Civil Service Commission.

The Federal civil service consists of approximately 40,000 positions, exclusive of some 10,000 or 15,000 positions exempt from the operation of the Civil Service Act. These exempted positions comprise ordinary skilled and unskilled labor classes and positions with an annual remuneration of less than \$200. The headquarters of the service at Ottawa constitute what is known as the "Inside Service," with approximately 10,000 positions. Positions outside of Ottawa constitute the "Outside Service."

The Civil Service Commission, consisting of three Commissioners, including the chairman, administers the Civil Service Act. Broadly speaking, the work of this commission may be divided into three phases: classification, organization, and examination. Classification may be defined as the grouping of positions into classes in such a manner as to provide approximately the same pay for the same kind of work. Positions involving substantially the same duties and qualifications carry a recognized scale of compensation, so that the principle of equal pay for equal work may be applied. As the service is constantly developing and changing, classification is continually expanding, and classification schedules are kept up with current requirements.

Organization may be defined as the setting of an adequate number of positions to carry on the work of a department. The requirements of each department are ascertained. A fair day's work for each class of employees is estimated, and after comparison of these two quantities the necessary staff is determined. Examination involves the principle of competition in filling government positions. When the merit system replaced patronage, it became at once essential to establish scientific methods of selection for the civil service, in order to secure a supply of qualified appointees to replace those who had dropped out, and to meet the needs of expansion and growth. Vacancies are duly advertised; candidates are summoned to write examinations at the most central places in the several provinces; examination papers are rated; and eligible lists are established.

In the higher technical and administrative positions, where executive and supervisory ability is essential and personal qualifications a determining factor, the oral test is frequently used. In the case of technical positions where academic tests are not applicable, the relative merit of candidates is determined by an advisory board of experts distinguished in the work for which the candidates are competing. By developing a sound selective process, the Civil Service Commission has endeavored to demonstrate the practicality of competition for a large variety of positions. The method of competition applies also to promotions, and

candidates for promotion to higher positions are rated for seniority, efficiency, and fitness.

In Canada, the reestablishment of the returned soldier has been considered in connection with government appointments. The Civil Service Act provides that in all appointments to the public service made by the Civil Service Commission, preference should be given to candidates who have been on active service overseas and who are found to possess the minimum qualifications for the position. A further preference is given to those who are in receipt of a pension for disabilities received as a result of war service.

The Superannuation Act of 1924 provides generous security to employees retiring after years of service. A deduction of five per cent is made from the salary of every permanent employee, as a contribution to the superannuation fund. The retiring age is sixty-five, and the maximum contribution period is thirty-five years. On attaining superannuation age, the allowance is one-fiftieth of the average salary for the last five years for each year of service, but not exceeding thirty-five years. The maximum allowance is, therefore, seventy per cent of such average salary. G.H.L.

CIVIL SERVICE REFORM. See **CIVIL SERVICE**

CIVIL SUIT. See **DEBT**.

CIVIL WAR. See **WAR OF SECESSION**.

CIVITAN, *siv' i tan*, **CLUBS**, business and professional men's clubs, whose motto is "Builders of Good Citizenship," and whose purpose is unselfish service to local community, state, or nation. The first Civitan Club was created late in 1917, in Birmingham, Ala. Since that time, the membership has increased to more than 7,500; the national headquarters are in Birmingham, Ala.

The national program of the organization is, in general, one of public service; tuberculosis control is a field especially stressed, and several sanatoriums have been established through the joint efforts of local clubs. Other projects include the care of orphaned and crippled children; Americanization work; city improvement; the control of crime, and many other local service movements.

CLAIBORNE'S REBELLION, *kla' bornz re-bel' yun*. In about 1631, William Claiborne, an energetic, resourceful colonial adventurer, established a trading post on Kent Island, in Chesapeake Bay, and induced many settlers to locate there. This settlement was then granted membership in the Virginia Assembly. Three years later, Lord Baltimore, under the Maryland charter he had received in 1632, claimed title to Kent Island, stating that Claiborne's rights were merely for purposes of trading. Claiborne rebelled and claimed independence and ownership; in these claims he was supported by Virginia. For years the dispute and re-

bellion lasted, causing loss of life and property, and Claiborne has often been called the evil genius of Maryland. Finally, in 1770, Virginia released all claims to the territory beyond the Potomac River, and the ambitions of the obstinate Claiborne were thus defeated.

CLAIMS, COURT OF, a court which settles claims against a government. In the United States such a court was established by act of Congress in 1855, and the legislatures of several of the states have created state courts of claims modeled on the national tribunal. The United States Court of Claims consists of a chief justice whose salary is \$12,500 a year, and four associates, each with a similar salary. Sessions are held in Washington.

This court has jurisdiction over all claims of citizens against the government, except those relating to pensions or over any regulation of an Executive department, or any contract entered into with the Federal government. Its jurisdiction is not extended, however, to any claim arising from a treaty with foreign nations or Indian tribes, these falling under the jurisdiction of the Supreme Court. In cases where the amount in dispute is more than \$3,000, appeal may be made to the Supreme Court of the United States within ninety days after the decision is rendered. As the United States or any state cannot be sued by citizens, the Court of Claims cannot countenance pressure by a litigant against the government on a claim for money; a decree favoring a plaintiff is really in the nature of a recommendation, which the government is usually inclined to accept. See **COURTS**.

In Canada, claims against the Dominion government for injury suffered in the construction of a public work are heard by the Exchequer Court of Canada. There is no tribunal under the name *court of claims* in the Dominion.

CLAIRVOYANCE, *klair voi' ans*, the alleged power to see beyond the range of human vision, or through opaque objects; also to foresee the future. It is sometimes called *second sight*, a term applied among the Scotch Highlanders. It is a widespread tradition and is connected with the more ancient notion of the possession of supernatural powers by favored individuals. The notion was revived in connection with the practices of mesmerism and of Spiritualism. J.J.

Relating to Various Beliefs. The articles on the following topics, while not bearing directly on clairvoyance, are of interest in this connection because they, too, deal with pseudo-sciences or superstitions

Alchemy
Astrology
Conjuring
Demonology
Divination
Faith Cure
Horoscope
Hypnotism
Magic

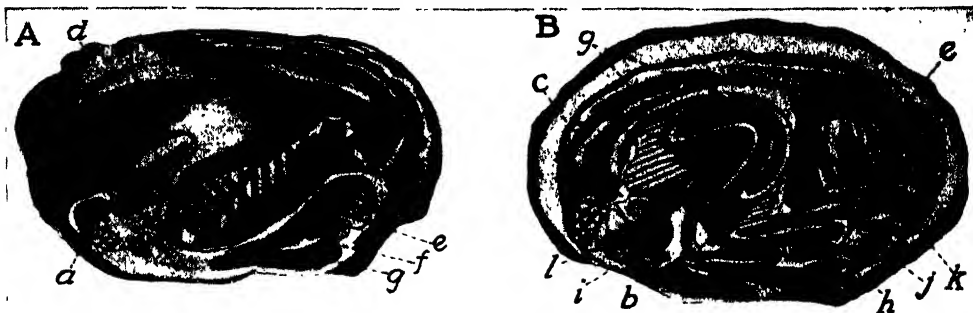
Medium
Mesmerism
Mind Reading
Necromancy
Occult
Palmistry
Phrenology
Physiognomy
Psychical Research

Psychoanalysis
Spiritualism
Subconscious
Suggestion

Superstition
Telepathy
Trance
Witchcraft

CLAM, a salt-water shellfish highly valued for food, especially on or near the seacoasts. The Pilgrims learned from the Indians the value of this bivalve mollusk, with its tightly

the shells themselves, the tips of which are all that appear above the surface of the sand. When disturbed, these clams send forth spurts of water and pull their siphons out of sight. They are secured by digging at low tide. Though not quite as good as quahogs, soft-shell clams are always in demand. They were the ones originally used in the famous



ANATOMY OF THE CLAM

A—Right Valve of Shell, to show internal organs

- (a) Anterior muscle for closing shell.
- (b) Opening of reproductive organ.
- (c) Brain.
- (d) Foot.
- (e) Gill.
- (f) Heart.

B—Dissection.

- (g) Intestine.
- (h) Kidney.
- (i) Liver.
- (j) Rear muscle for closing shell
- (k) Space through which water passes in leaving shell.
- (l) Stomach

closing double-hinged shell (see MOLLUSKS). The Indian name *quahog* is given to the hard-shell clam, which has a nearly globular shell that was employed as money by the Indians (see WAMPUM). The quahog does not burrow, but, standing erect on its thin edge, shoves itself along the sandy sea bottom. It is found

Rhode Island clam chowders and at the New England clambakes. Soft-shell clams have also been used for bait, and the walrus, the Arctic fox, and many birds will eat them. The food of all clams consists of the tiniest animals of the sea.

A *giant clam* is found on the coral reefs of the East Indies, its shell alone weighing 500 pounds or more. Natives often use parts of its sharp-edged shell for axes.

The term *clam* is also applied to fresh-water mussels. See MUSSEL.

S.H.S.

Scientific Names. The scientific name of the quahog is *Venus mercenaria*, of the soft-shell clam, *Mya arenaria*; of the giant, *Tridacna gigas*.

CLAN, originally a body of men bound by the ties of blood relationship, having a class name and a tribal organization ruled by a chief. As later used, the word meant a body of persons closely united by some common pursuit or interest, to the exclusion of other persons, with no regard to family ties.

The clan system is said to have sprung up about 1008, while Malcolm II of Scotland was king, and was peculiar to the counties of Ireland and the Highlands of Scotland. Among the Highlanders, there was no liking for written agreements or charters, so the feudal system had but little hold; the clansmen were governed by men of the same blood, being united by descent from a common ancestor, and obligation of all the members to avenge one another's injuries was the most common principle cherished by them.



CLAM-FISHING

How fresh-water, pearl-bearing mussels are caught in the Mississippi River

from Cape Cod south. The young are known as *little-necks*, after Little Neck, Long Island, where they were first found. These clams are obtained by raking.

Down in the gravelly bottoms of river mouths, from South Carolina to Greenland, in San Francisco Bay, and on the British coast, are found the *soft-shell*, or *sand clams*. Their shells are smooth, thin, chalky, and somewhat oval. They have siphons often longer than

When, by the rise of towns and by conquest, the tribal system began to be broken up and a common surname was needed for keeping up such connection, a chieftain of a tribe selected some ancestor and called himself by that name with the prefix *Mac*, meaning *son*. All of his kindred adopted the same name, and in Scotland, *Mac* came to be generally used in the great clan which included the smaller clans of the MacDonalds, MacGregors, etc. The clansmen had the utmost reverence for their chief or lord, and obeyed his commands without question. Each clan occupied a certain portion of land, and among neighboring clans hostilities were frequent.

After a rebellion in 1745 and the subsequent disarming of the clans, the tribal system was practically broken up, though in the more remote districts of the Highlands, the old beliefs linger, and the interesting poetical traditions survive in the memories of the people.

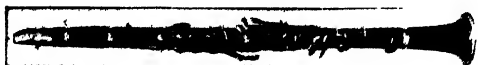
CLARENDON, EDWARD HYDE, Earl of (1609-1674), an English historian and statesman, important in history during the reigns of Charles I and II. He began his political career in 1640, as a member of the Short and Long Parliaments summoned by Charles I, and, having become a leader of the king's party in the House of Commons, joined the Royalists on the outbreak of the civil war. He accompanied Prince Charles (afterward Charles II) in his flight to Jersey, remained on the island for two years, and began there his great literary work, *History of the Rebellion*. In 1643 he was knighted and made Chancellor of the Exchequer. Clarendon made every effort to save the life of Charles I, and was equally zealous in promoting the restoration of Prince Charles. In 1658 he was formally declared Lord Chancellor, and for several years was the trusted adviser of Charles II, but, having gained the ill will of the people because of the unsuccessful Dutch war and the sale of Dunkirk to the French, and having offended the king by opposing the latter's divorce, he fell from power and went into exile.

Related Subjects. The following articles in these volumes should be read in connection with the life of the Earl of Clarendon:

Charles (I, II, England)	Cromwell, Oliver
Commonwealth of England	Long Parliament
	Restoration, The

CLARET, *klair' et*, OR **BORDEAUX**, *hawrdoh'*, a still, dry, sour, red wine. It is called a still wine, because it does not contain a gas which makes it sparkle, as is the case with champagne. This wine has very little sugar. The genuine clarets were originally made in France, mostly at Bordeaux. The plant louse (*phylloxera*) wiped out so many vineyards, however, that for years many cheap mixtures have been sold as claret. A genuine claret is made in California and, before the advent of prohibition, was a popular wine in that region.

CLARINET, *klair' ih nel*, the leading instrument in military bands, corresponding to the violin in the orchestra. In fullness and variety of tone, the clarinet is considered the most perfect of wind instruments. It is usually of wood, with a trumpet-shaped mouthpiece, in which is placed a thin reed, the vibrations of which produce the tones; the fingers playing on keys



THE CLARINET

covering holes in the tube produce the melody. A range of three and one-half octaves is covered, but purity of tone and ease of playing necessitate the use of clarinets of different pitch. Clarinets commonly employed in orchestra music are those in *F*, *C*, *B*, *A*, alto (*E*), bass (*B*), and contrabass (*B*).

In his book on the wind-band, Arthur A. Clappé says:

Each clarinet is distinct from the other in shades of tone. The ponderous gravity of the contrabass, violoncello-like effect of the bass clarinet, sympathetic and viola-like quality of the alto clarinet, beautiful mezzo tints of the *A* and *B* clarinets, and crystalline brilliancy of those in *C* and *E*, afford ample opportunity for expression in every degree of emotional force which a composer seeks to depict in the string quartet and quintet.

CLARK, CHAMP [JAMES BEAUCHAMP] (1850-1921), one of the best-known leaders in the Democratic party in his generation. In 1913 he was honored with the most influential office in the United States below the Presidency, the Speakership of the House of Representatives, which he held for eight years. He was born in Kentucky, was graduated at Bethany College, West Virginia, and then from the Cincinnati Law School. Before he became prominent in politics he worked as a farm laborer, clerk, editor, and lawyer, and served as president of Marshall College, in West Virginia. In 1880 he began the practice of law in Bowling Green, Mo., and nine years later was elected to the national House of Representatives; he represented Missouri in that body continuously from then until his death, except for two terms, from 1891 to 1893 and 1895 to 1897.



Photo Brown Br.

CHAMP CLARK

Speaker of the United States House of Representatives from 1911 to 1917.

Clark became Democratic leader in the House in the second session of the Sixtieth Congress, in 1911. He was one of the strongest candidates for the Presidency in the Baltimore convention of 1912; Woodrow Wilson, however, was nominated after more than thirty ballots, largely due to the political skill of William Jennings Bryan.

CLARK, CHARLES E. See SPANISH-AMERICAN WAR.

CLARK, FRANCIS EDWARD (1851-1927), founder of the Young People's Society of Christian Endeavor, and for many years editor of the *Golden Rule*, the paper of that organization.



Photo: U & U

FRANCIS E. CLARK

He was born in Aylmer, Ont. After his graduation from Dartmouth College and Andover Theological Seminary, he became a Congregational clergyman. From 1876 to 1883, he was pastor of a church in Portland, Me., and he spent the following five years in charge of a Boston church. After that time, Mr. Clark devoted himself to

Christian Endeavor work, traveling around the world six times in its interests, and serving continuously as president of the United Society. See CHRISTIAN ENDEAVOR.

CLARK, GEORGE ROGERS (1752-1818), a famous American soldier and frontiersman, whose military successes in the old Northwest during the Revolutionary War gave the United States its chief claim, in the peace negotiations, to the territory between the Mississippi River and the Alleghany Mountains. He was a brother of William Clark (later of Lewis and Clark fame), and was born near Monticello, Va. At the beginning of the Revolution, he was chosen a delegate to represent Kentucky, then a district of Virginia, in negotiations which resulted in organizing Kentucky as a separate government.

In 1778, as lieutenant colonel, Clark raised a force of troops and began the conquest of the Northwest by capturing Kaskaskia, the oldest town in Illinois, from the French; this victory he followed up by seizures of the other French villages, Cahokia and Vincennes. In 1780 he accepted a command under Baron von Steuben to defend Virginia against the British, and from that time on until the close of the Revolution, was engaged in active warfare against the English and the Indians, winning many notable victories, and in 1782 destroying five Indian villages on the Scioto and Miami rivers. Ten years after the close of the war, he accepted a commission as major general to recapture Span-

ish possessions on the Mississippi for the French, but the plan was not carried out. His last years were spent in retirement on an estate



Photo: Quincy Herald-Whig

MEMORIAL TO GEORGE ROGERS CLARK

A monument erected in Riverview Park, Quincy, Ill.

in the present state of Indiana, a gift from the Virginia legislature. See ILLINOIS (History).

CLARK, WILLIAM (1770-1838), an American soldier and explorer, famed for his association with Meriwether Lewis in an expedition to the Pacific coast, to explore parts of the new Louisiana Purchase. He was a brother of George Rogers Clark, was born in Virginia, and at the age of fourteen removed with his family to the site of Louisville, Ky. Eight years later he joined the army as lieutenant of infantry, and in 1794, under General Wayne, took part in a campaign against the Indians. In 1796



Photo: Brown Bros.

WILLIAM CLARK

he resigned because of ill health, but in 1803 again entered the army and was commissioned second lieutenant. The following year Clark

and Lewis began their memorable exploring trip westward, traveling 8,500 miles in two and one-half years. Clark was later made Indian agent for Upper Louisiana, was governor of Missouri Territory between 1813 and 1821, and from 1822 until his death was superintendent of Indian affairs at Saint Louis.

Related Subjects. See LEWIS AND CLARK EXPEDITION, accompanying which is a map of the route followed, also LOUISIANA PURCHASE, CLARK, GEORGE ROGERS; LEWIS, MERIWETHER.

CLARKE, JAMES P. See STATUARY HALL.
CLARKE'S CROW. See NUTCRACKER.

CLARKSBURG, W. VA. See WEST VIRGINIA (back of map).

CLARK UNIVERSITY, a graduate school, was founded in 1887 and opened two years later, at Worcester, Mass., by Jonas Gilman Clark. Under its first president, Dr. G. Stanley Hall, the university emphasized the study of psychology, particularly in research. An undergraduate school (Clark College) was organized as a separate institution in 1902, and in 1920 the college and university were united. A Graduate School of Geography, a unique enterprise in American education, has been established. The university admits only young men, but the graduate courses, leading to the degree of A.M., are open to both sexes.

CLASS, in the sciences. See CLASSIFICATION; ZOÖLOGY (Divisions of the Animal World).

CLASSICS, *klas' iks*, a name applied very generally to writings of the highest rank, but more especially to the best literary and art productions of the world—those that are accepted as standard. The period of most brilliant literary activity of any nation is usually referred to as its *classical period*; its best writings are known as its *classics*. Thus, Thackeray, Dickens, and George Eliot are numbered among the classic novelists in English literature, and Shakespeare, Browning, Tennyson, Longfellow, Whittier, Poe, and others of their rank are classics among the poets. Because the greatest productions of ancient times have come to be regarded as the highest examples of literary excellence, the word is applied, in a narrower sense, to the best writers of ancient Greece and Rome, and *classic* and *ancient* are frequently used with the same meaning. The Doric, Ionic, and Corinthian are known as the *classic orders* of Greek architecture. The term *classics*, when referring to studies, means usually the Greek and Latin languages.

CLASSIFICATION, an orderly arrangement of objects into groups, the objects in each group having some common resemblance. If a boy is given a number of circles, triangles, and squares and told to "sort" them, he will place the circles in one group, the triangles in another, and the squares in a third. He has classified the objects according to shape or form.

If the objects were of different sizes, he might classify them according to size, or if they were of different colors, he might classify them according to color. Again, suppose a child is given a collection of flowers which contains pinks of different colors, roses of different colors, and lilies, and is asked to put all the pinks in one group, all the roses in another, and the lilies in a third; he then has a more difficult task, because in making his classification he must consider both color and form. If some of the roses are single and some double, the difficulty is increased, for in order to place all the roses in the rose group, he must observe the plan and structure of the flowers.

The term *classification*, as applied to the study of plants (botany) and animals (zoölogy), means the arranging of all plants and animals in divisions and subdivisions, each of which depends upon some characteristic common to all objects that it includes. That is, all plants included in the rose family must bear some resemblance to the rose; all animals belonging to the cat family must have some characteristics of the cat. There are so many different kinds of plants and animals that this orderly arrangement became necessary to their systematic study, and scientists have been working upon systems of classification for more than a century. The science of classification is known as *taxonomy*.

Modern classifications are based on the work of the Swedish naturalist Linné (Linnaeus), although the extensive development of natural science since his death, late in the eighteenth century, has made it necessary greatly to modify the scheme of classification that he originated. To Linnaeus, also, we owe the accepted system of naming plants and animals by use of Latin terms. Latin was adopted for three reasons: First, it was the language in which scientific works were written when these classifications were begun; second, Latin is a dead language, and the meaning of the words does not change; third, the use of Latin gives the same name to the object wherever it may be found. Many plants and animals are known by different popular names in different localities. The bird known as the *bobolink* in the northern part of the United States and in Canada is known as the *reedbird* in Ohio and the *ricebird* in the South. One unacquainted with this fact would naturally think that three different birds were named. If, however, the Latin name *Dolichonyx oryzivorus* were placed after each popular name, we should know that these three names were applied to the same bird. It is important for the reader interested in natural history to become familiar with this plan of nomenclature.

Groups in Classification. The basic units employed in classifying plants and animals are the *species*, *genus*, *family*, *order*, *class*, and *phy-*

lum (the latter also known as *branch*, *subkingdom*, and *grand division*). There are, besides, various subdivisions of these units, as *variety*, a smaller group in the species; *subgenus*, *subfamily*, etc. An order may be divided into *superfamilies* or *suborders*; a class into *subclasses*. The basic units are defined as follows:

Species. A species is a group of individuals that reproduce their kind and are so much alike in essential particulars that it is reasonable to believe they have a common origin. There are, for example, many different kinds of wild roses. Among them are roses having long, climbing, bramblelike stems, three to five leaflets, and deep-rose petals. There are others having smooth, purple-red stems, five to seven leaflets, and unusually large flowers. Here are two groups of roses, the individuals in each group having certain distinguishing characteristics that set them apart from other roses. Hence each group constitutes a species. The former, commonly called *prairie rose*, is given the Latin name *setigera*; the latter, called the *meadow rose*, is known scientifically as *blanda*.

Variety. In many cases we find individuals within the species that show certain variations from the general type, but whose points of difference are not pronounced or important enough to warrant their being classed as a separate species. Such varying individuals are said to constitute a variety, or subspecies. In floriculture and some other departments of agriculture, *variety* has a specialized meaning (see BREEDING; HYBRID).

Genus. Just as related individuals may constitute a species, so several related species are grouped together in the same genus (plural, *genera*). A genus is made up of plants or animals having certain points of resemblance, but which do not resemble each other closely enough to form a single species. For example, the prairie rose and meadow rose, and all the other rose species, are sufficiently alike to be recognized as roses, but they are not enough alike to form a distinct species. Thus, all of the roses, separated into groups on the basis of common characteristics, are brought together into the larger group *Rosa*, a genus. The scientific name of the prairie rose, *Rosa setigera*, indicates both the genus and the species to which it belongs.

Family. Several genera having one or more points of relationship are grouped together into a family. The genus *Rosa* and a large number of other genera constitute the family *Rosaceae*, in which the common characteristic is the possession of regular flowers, with numerous distinct stamens inserted on the calyx. Among the other genera included in this family are *Spiraea*, represented by the meadowsweet and bridal wreath; *Pyrus*, to which belong the pear and the apple; and *Prunus*, including the plum and the cherry. A good type family in the animal world is *Felidae*, the cats, animals possessing retractile claws. The dominant genus is *Felis*, which includes, among other species, the house cat, the jaguar, the lion, and the tiger. Other genera are *Cynaelurus*, represented by the cheeta, and *Lynx*, to which the Canada lynx and bobcat belong.

Order. This is a group of related families. With several other families, the rose family is placed in the order *Rosales*, on the basis of flower structure. Likewise, the cats are grouped with the dog family, *Canidae*, the bears, *Ursidae*, the weasels, *Mustelidae*, and others, in the order *Carnivora*, or flesh-eating animals.

Hoofed animals, such as the horse, cattle, deer, and sheep, are placed in the order *Ungulata*. The gnawing animals, represented by the rat, rabbit, and squirrel, belong to the order *Rodentia*.

Class. Several orders of plants or animals are grouped together to form a class. The plants of the order *Rosales* and numerous others having the common characteristic of possessing two seed leaves are all placed in the class *Dicotyledoneae*. Likewise, the flesh-eating, hoofed, and gnawing animals, and some others, are placed in the class *Mammalia*, for animals in these orders have as a common characteristic the possession of milk glands for the nourishment of the young.

Phylum, or Branch. The entire plant kingdom is divided into four main branches, or phyla, and the animal kingdom into a number that varies according to different systems of classification. Some authorities give as high as twenty, but twelve is an average number. Each plant and animal phylum is made up of a number of classes having one or more points of relationship. *Dicotyledonous* plants are grouped with *monocotyledonous* plants (those with one seed leaf) to form the phylum *Spermatophyta*, containing all plants that bear seeds. This great branch is divided into two subphyla—*gymnosperms*, or naked-seed plants, such as the pines, and *angiosperms*, or enclosed-seed plants. To the latter group belong both of the classes mentioned above.

The class *Mammalia* is one of several in the phylum *Chordata*, which includes all animals that have a supporting rod of cartilage at some stage of development. The higher animals in this branch develop a bony vertebral column, and so form the subphylum of vertebrate animals, to which all of the mammals belong, as well as the birds, reptiles, amphibians, and fishes.

It may be seen from the foregoing summary that every species of plant and animal, from the lowest to the highest, has a place in the classification scheme. To recapitulate, the prairie rose is classified as follows.

Kingdom—Plant

Phylum—Spermatophyta

Subphylum—Angiospermae

Class—Dicotyledoneae

Order—Rosales

Family—Rosaceae

Genus—*Rosa*

Species—*Setigera*

R.H.

Related Subjects. The reader is referred in these volumes to the following articles:

Animal	Evolution	Plant
Botany	Linné	Zoology

CLAUDE LORRAIN. See *GELÉE*, CLAUDE.

CLAUDIAN, *klaw' dih an*, **AQUEDUCT.** See **CLAUDIUS**.

CLAUDIUS, *klaw' dih us* (10 B.C.—54 A.D.), a Roman emperor, whose reign is memorable because of his admission of the Gallic nobles of the empire to the Roman Senate and to the city offices. He was the son of Claudius Drusus Nero, stepson of Augustus, and had little part in public affairs until A.D. 41, when, on the murder of Caligula, he was declared emperor by the soldiers. His liberal spirit was shown not only in his treatment of the Gallic nobles, but in humane laws regarding freedmen, slaves,

widows, and orphans. In his reign, the southern part of Britain was conquered and made a Roman province, and he himself gave his attention to the improvement of Rome. The Claudian Aqueduct, which he completed, brought water to the city from a distance of forty-five miles. The great blot upon his character was his weakness in yielding to the influence of intriguing wives and favorites. In A.D. 54 he was poisoned by his fourth wife, Agrippina, the mother of Nero. See AGRIPPINA; CALIGULA.



CLAUDIUS

A coin of his reign, showing his head.

CLAVICHORD. See PIANO.

CLAVICLE. See SKELETON.

CLAY is commonly thought of as the earth used in making brick, tile, and pottery. It is a more or less coherent but ordinarily not very

cal clay has an unctuous feel, soils the fingers, and when thoroughly wet becomes a sticky, yet slippery, mud. When thoroughly dry, most clay has little coherence and is easily reduced to powder or dust. Ordinary clay is composed largely, if not wholly, of one or more hydrous silicates of aluminum, but a few clays contain little or no aluminous material. The purest form of clay is white, and consists of kaolin. Most clay, however, is more or less deeply colored by iron oxide, carbonaceous matter, or other material. Clay containing much calcium carbonate is called *marl*, and that containing a large amount of silica is called *fire clay*.

Clays are of two sorts—*residual* clays, which are not stratified unless the rock from which they were derived was a stratified rock, and *sedimentary* clays, which ordinarily are stratified. Residual clays have been formed as the final product of the weathering of rocks, especially those containing considerable amounts of aluminous minerals. Sedimentary clays were deposited by water or wind after transportation from elsewhere, although the material may originally have been of residual origin. Most clay, therefore, has been derived from the decomposition of older rocks, especially those containing feldspar. Some clay was formed by the grinding action of a glacier.

Clay is an important constituent of soils. It absorbs ammonia and other gases necessary to the growth of plants, and retains in the soil the fertilizing substances supplied by manures. Without a certain amount of clay, soil will not retain its fertility from season to season. Too much clay, on the other hand, is detrimental in making the soil stiff and cold, in retaining too much water on the surface, and in hardening it too much in time of drouth.

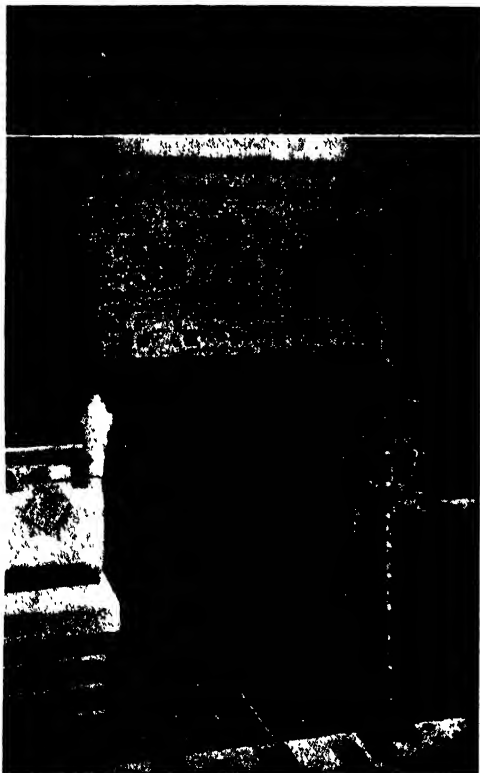
When moist, clay is sufficiently plastic to be molded into any form desired, to be rolled into thin sheets, or to be drawn into rods that can be twisted into ornamental shapes. When heated to the proper temperature, clay shrinks and becomes hard and compact, and hence finds a great variety of uses.

Differences in composition give rise to several sorts of clay, with their special names and industrial uses. Pure *kaolin* is used in making the finest grades of porcelain. *Fire clay*, which is highly resistant to heat, is used for stove and furnace linings, fire brick, gas retorts, crucibles, and the like. *Potter's clay* and *pipe clay*, which are less pure than kaolin, are used, respectively, in the manufacture of inexpensive grades of pottery and of pipes. *Paper clay* is a fine-grained variety used in filling paper. L.LaF.

CLAY PRODUCTS ADMIRABLY USED

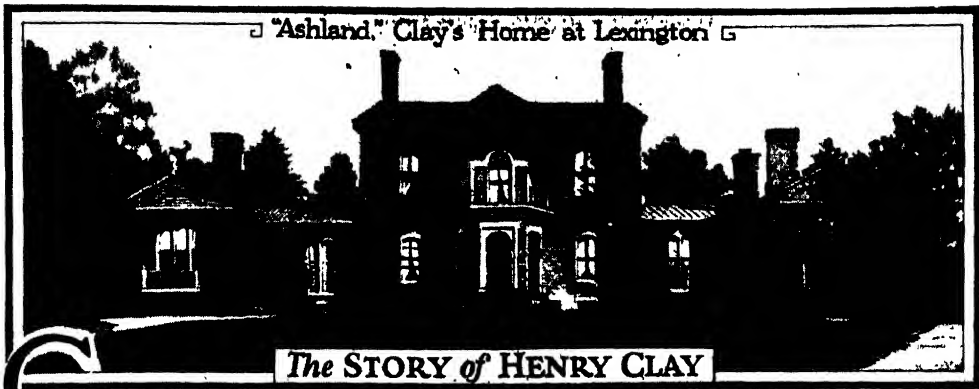
An entrance to a home in New York City, in which tile, brick, and faience were employed. Above, unrelated to the doorway, is a pleasing terra cotta.

hard mass, whether or not stratified, of extremely fine particles of mineral matter. Typi-



Related Subjects. The reader is referred in these volumes to the following articles:

Alumina	Kaolin	Silica
Brick	Marl	Soil
Feldspar	Porcelain	Terra Cotta
Fuller's Earth	Pottery	Tiles



CLAY, HENRY (1777-1852). This distinguished leader in American public affairs was born at a time when his country was fighting for independence from British rule, and died less than a decade before the bitter struggle over the slavery question reached its climax in a clash of arms. For thirty years he gave his best efforts to warding off that great conflict, thereby winning the title, "The Great Pacificator," that will be associated with him for all time.

Henry Clay was born April 12, 1777, the son of a Baptist clergyman of Hanover County, Va., who died when the boy was four years old. He had few opportunities to attend school, and was forced to take a position in a retail business house at the age of fourteen; but he overcame early disadvantages by studious habits, love of reading, and a naturally keen and alert mind. Having readily mastered the principles of law, he was admitted to the Virginia bar in 1797 and began practice at Lexington, Ky. Two years later, as a member of the state constitutional convention, he began his long political career. By this time, also, he had won local fame as a brilliant orator and as a lawyer who was able to win his cases.

Clay was sent to the legislature of Kentucky in 1803, and in 1806-1807 and 1810-1811 filled unexpired terms in the United States Senate. When first chosen Senator, he had not reached the legal age required by the Constitution, though the matter was not brought to the official notice of the Senate. In 1811, then thirty-four years of age, he entered the national House of Representatives, and was elected Speaker on the first day of the session. Five times thereafter he was reelected to the House and to the Speakership, holding office continuously until 1825, except for the term between 1821 and 1823, when he returned to his law practice.

Almost at the very outset of his long career in the House, he won popularity as an advocate of the War of 1812, and at its close was chosen one of the peace commissioners; he

signed the Treaty of Ghent (1814), which concluded the struggle.

Resuming his activities in Congress on his return from the peace conference, Clay became a vigorous champion of protective tariff and of the government policy of internal improvements; but these issues were soon overshadowed by the greater problems involved in the slavery question, destined to be the dominant issue for years to come. In 1820 he used his influence to secure the passage of the Missouri Compromise, whereby Missouri entered the Union as a slave state. At this time he was first called "The Great Pacificator;" the name clung to him throughout his life.

Though he was opposed to slavery and never hesitated to denounce what he called a "stain on the national character," the leading purpose in his public life was, in his own words, "the preservation of the Union," and in this patriotic ideal may be found the explanation of all his efforts to allay the strife between the pro- and anti-slavery parties. To him the quickest and most effective means of keeping peace was the policy of compromise.

In 1824 Clay was an unsuccessful candidate for the Presidency against Andrew Jackson, William H. Crawford of Georgia, and John Quincy Adams. Clay and Adams were then leaders of the newly founded National Republican party, later known as the Whig. As no candidate had a majority of the electoral votes, the election was thrown into the House of Representatives. Clay, being fourth on the list, was ineligible, and therefore gave his personal support to Adams, who appointed



Photo: U & U

HENRY CLAY

Clay his Secretary of State. This appointment was the basis for a widely circulated charge of corruption between Adams and Clay, which, though unfounded, was used to the latter's injury throughout his career, especially by his bitter political rival, Andrew Jackson. The harsh language used by John Randolph in denunciation of this supposed "deal" led to a duel between himself and Clay, in which neither was injured.

Adams showed excellent judgment in his selection of Clay as head of the State Department, but the latter felt that a seat in Congress offered the best opportunities for political leadership; moreover, he considered his absence from the House a hindrance in the attainment of what was now the great ambition of his life—the Presidency. Having vainly opposed the candidacy of Jackson in the election of 1828, he retired to private life at the end of Adams' administration.

Two years later, in 1831, the state of Kentucky again sent him to the Senate, where the tariff issue, bound up in the greater issue of slavery, once more engaged his attention. The South, which was bitterly protesting against the "tariff of abominations" of 1828, he endeavored to pacify by the more moderate law of 1832.

This measure, however, provoked threats of nullification and secession, and the next year he brought forward the famous compromise of 1833, which caused its author again to be hailed as "The Great Pacificator." Meanwhile, in 1832, he had been unanimously nominated for the Presidency by the Whigs, but in the election lost overwhelmingly to Jackson, largely because of his tariff record.

During the Democratic administration of Martin Van Buren, Clay was an unsuccessful leader of the opponents of the independent subtreasury system. He was at this time steering a middle course in the troubled sea of the slavery dispute, thereby pleasing neither side. In 1839 he delivered a speech in which he declared himself the foe of slavery, but stated in no uncertain terms that the abolitionists were responsible for the discord that was threatening to disrupt the Union. Warned by his friends that this speech would ruin his chances for the Presidency, he made the often-quoted remark, "I would rather be right than be President."

In 1842 he retired from the Senate, and two years later unsuccessfully contended for the Presidency against James K. Polk of Tennessee. Clay's hesitancy in taking a firm stand against the annexation of Texas alienated the abolitionists. In 1848 he was defeated for the Whig nomination by Taylor, but in the same year was reelected to the Senate, and devoted the remaining years of his life to preserving peace between the Northern and the Southern states.

In 1850 he made his last great speech in the Senate in support of the Compromise of 1850, a group of measures that postponed for ten years the outbreak of the War of Secession.

During his career in the Senate Clay shared with Daniel Webster and John C. Calhoun the glories of that great trio of American orators. From a literary standpoint his speeches have not the excellence of Webster's, but his eloquence, personal magnetism, fine bearing, and above all, his voice, which was likened by his hearers to some delicately attuned musical instrument, combined to produce an effect comparable to that attained by the oratory of his great contemporary.

B.M.W.

Related Subjects. For a broader view of Clay's activities the reader is referred to the following articles in these volumes

Adams, John Quincy
Compromise of 1850
Cumberland Road
Jackson, Andrew

Missouri Compromise
Nullification
Political Parties
Tariff

CLAYMORE, a large, two-edged sword. See **BROADSWORD**.

CLAYTON, JOHN M., one of the framers of the Clayton-Bulwer Treaty (which see).

CLAYTON ANTI-TRUST ACT. See **WILSON, WOODROW** (Administration); **TRUST**.

CLAYTON-BULWER TREATY, a treaty entered into between Great Britain and the United States in 1850, so named because it was signed after long deliberation between John M. Clayton, Secretary of State, and Sir Henry Bulwer, the British minister to the United States. Both countries agreed to guarantee the neutrality of a canal through Central America, without exercising any control over the territory or in any way fortifying it. Repeated attempts were made later to change the wording of the Clayton-Bulwer Treaty, in order to give America greater power over any inter-oceanic canal which might be built; and at times discussion of the subject led to strained relations between Great Britain and the United States. In 1901 the Clayton-Bulwer Treaty was abrogated, and the Hay-Pauncefote Treaty came into force.

Related Subjects. The reader is referred in these volumes to the following articles:

Hay-Pauncefote Treaty	Nicaragua Canal
Nicaragua	Panama Canal
Taylor, Zachary (Administration)	

CLEANING PROCESSES. Cleanliness is an essential element of health and personal comfort. From the earliest times, dirt has been a nuisance to mankind, and from the beginning of history we have accounts of the primitive methods of washing and cleansing.

Modern science has shown us a new reason for sanitation—that many of the diseases and plagues of the world have been due to a lack of proper sanitary provisions. It has also given us new weapons for the battle—chemistry to

conquer bacteria, and mechanical appliances to remove inert materials.

Among the most important cleaning processes are laundering, dry cleaning, and vacuum cleaning. The first two are discussed here; the third is in the article **VACUUM CLEANER**.

Laundering. The essential element in this process is the washing of fabrics with soap and water. This can be done either by hand or by the use of machines, and since the work is laborious, the latter are coming more and more into use.

The soap may be dissolved in the water or rubbed on the materials; the water should be as hot as can comfortably be used. Rubbing is necessary to make the soapy water go through the fibers of the fabric, and rinsing will then carry away the dirt.

There are numerous details in the work of laundering, such as soaking, boiling, bluing, starching, drying, and ironing. These are performed according to the kind of fabric and the result desired, as well as according to the equipment available. The present tendency is to use mechanical devices wherever possible, both in the home and in the commercial laundry. The widespread use of electricity has been a valuable aid in laundry work, as it furnishes power to drive washing machines, and makes possible the electric iron.

Dry Cleaning. The cleaning of fabrics by the dry-cleaning process is done by immersion in a liquid which dissolves fat. The term *dry cleaning* was adopted to distinguish the method from the ordinary laundering with soap and water, as no water is used in the process of dry cleaning. Because the dry-cleaning process originated in France, it is sometimes called the French method. Although less used, the term *chemical cleaning* is more apt than either of the other two, for the process is based on the chemical action of the fluid on grease.

As a garment is worn, a certain amount of grease, which holds the dust and dirt, accumulates. By removing the grease, the dirt is released. Many fabrics are shrunk, or otherwise injured by soap and water, and furthermore, the grease remains unaffected by water. By dipping the garment in such solvents as benzine or benzol, the fabric is uninjured, and the grease is dissolved; the dirt, therefore, is removed mechanically.

Method and Equipment. The first step in the process is to free the garment of all dust; this may be done by whipping with sticks, or by the use of a revolving wheel device. Thorough brushing and drying is of next importance. Then comes the actual dipping. Benzine or benzol is generally used, although gasoline, naphtha, turpentine, and carbon tetrachloride are also commonly employed. Tubs, vats, or washing machines are filled with the cleaning fluid, and a special cleaning soap is dissolved

in the first tub. Frequent rinsing is important. After the dipping process, the article is freed of the solvent by a centrifugal extractor, then transferred to the drying room, and finally inspected for spots. By means of scientific experiments, the action of certain chemicals on certain stains, dyes, etc., has been worked out to a remarkable degree.

All plants are necessarily equipped with stills for reclaiming gasoline, a benzine clarifier, a ventilation system, and a safety storage system. The larger the plant, the more complete is the equipment.

Development as an Industry. It appears that as early as 1848 a dry-cleaning method was known; however, it has been only since M. Judlin, a Frenchman, discovered the cleansing powers of benzine, in 1866, that dry cleaning has become an industry of importance, and a business which requires a wide knowledge of fabrics, dyes, and chemicals. The growth of the industry is largely due to the realization by the general public that the cleaning plant is a great economy and, through its ability to keep outer garments in a sanitary condition, an aid to better health. Thus the cleaner has become an important factor in the scheme of present-day living.

CLEARING HOUSE. We are living in an age when time and labor-saving devices are used in all branches of human activity. In modern banking, the clearing house is such a device. It is an institution maintained by an association of banks in a city, which secures daily a speedy settlement of the claims each bank has against the others, with the least possible transfer of actual cash among them.

The Work of a Clearing House. A brief description is given below of the method used in the New York Clearing House, which was the first one organized in America; it served as a model for all later ones. Each bank sends to the clearing house at least two representatives, a so-called delivery clerk and a settling clerk. In a large room, each bank is assigned a desk at which the settling clerk or clerks are seated. Upon arrival at the clearing house, each clerk hands over to the manager of the room a list of the amounts due to his bank from each of the other banks, as shown by the checks, drafts, and other obligations which the clerk has brought with him. Promptly at 10 o'clock, the delivery clerks begin passing from one desk to another, delivering to each settling clerk the bundles of claims of all sorts their banks have against his bank. After each settling clerk has received all of these claims, he draws up a statement which shows the balance his bank should pay or receive. These statements are handed over to the manager of the room, who, after checking them, reads out the amount which each bank owes to all the other banks or is entitled to receive from them. Later in

the day, the amounts due by the debtor banks are paid to the clearing-house manager, who in turn pays the creditor banks. In this way, each bank settles all its obligations to all the other banks of the city by one single payment, instead of settling with each bank separately.

History. In London, in the seventeenth century, it was the custom of the banks to use "walk clerks" or "collectors," as we would call them, to go to each of the other banks in turn and collect the actual cash to cover checks, drafts, and other credits which had accumulated in the previous day's business.

About 1670, two of these walk clerks chanced to meet in a coffee-house, where each had gone for a little refreshment. It appears that messengers of those days were no more eager for work than are some in our own time, so it seemed a clever idea to these youths to effect their exchange then and there, thus eliminating the long walk and the attendant fatigue, also permitting more time for refreshments.

Their banks did not at once discover the subterfuge, and so the simple method was continued. Other clerks learned of the time- and labor-saving scheme of their colleagues, and before long the coffee-house had become the first clearing house. Many thousands of pounds changed hands daily without authority or sanction of the banks, who believed their clerks to be following their tedious rounds, instead of disposing of the business in hand in a fraction of the former time.

When the practice was discovered, there was division of opinion among the bankers. Some ordered it stopped forthwith. Others, perceiving the germ of merit in the idea, held out for its development. The latter prevailed, and a room was engaged for the use of the boys. Later, a set of clearing rules was devised, and a manager was placed in charge of the entire activity. From this informal beginning evolved the London Clearing House, the largest in the world.

Time and the development of American banking brought the system to this country. New York established its clearing house in 1853, followed by Boston, Philadelphia, Pittsburgh, and Chicago, in turn. Now, every city of size or commercial importance has its clearing house. All follow the same elementary idea of convenience and economy of time and labor, though local conditions make special rules advisable. F.H.E.

CLEFTAGE, *kleev' aje*, the property possessed by some metamorphic rocks and by many crystalline minerals of being divisible in certain directions into layers or thin sheets. The flat surfaces separating the layers are called *cleavage planes*. The cleavage of rocks and that of minerals differ in several ways, and are due to quite different causes.

True rock cleavage is found only in fine-grained metamorphic rocks of rather uniform mineral composition, such as slate and some



Photo Visual Education Service

PERPENDICULAR CLEFTAGE

varieties of schists. It is not a structure that the rocks have possessed since their formation, but was imposed upon them when they were metamorphosed under intense pressure. The metamorphosed rocks are composed largely or wholly of minerals in the form of small flakes, or of small platelike crystals that lie nearly parallel. Consequently, they can be split into slabs or thin layers with fairly smooth sides, in a direction parallel to the flat crystals, but not in any other direction.

Mineral cleavage, on the other hand, is inherent in the minerals that possess it; it is due to the atomic structure of the crystals and not to any later changes imposed from without. Some minerals, such as mica, are cleavable in only one direction, but others are cleavable in as many as four directions. The number of directions in which a mineral is cleavable is related to the degree of symmetry of its crystallization, but the cleavage planes in a crystal are not necessarily parallel to faces actually developed on that particular crystal.

Cleavage, in both rocks and minerals, may be advantageous or detrimental, according to the purpose for which the material is to be used. In the manufacture of roofing slates, the rock is split along its cleavage planes, and the usefulness of mica in industry depends

largely on its nearly perfect cleavage. See METAMORPHISM.

L.LaF.

CLEAVELAND, MOSES, founder of Cleveland, Ohio (which see).

CLEBURNE, *kle' burn*, TEX. See TEXAS (back of map).

CLEF. See MUSIC (A Course of Lessons).

CLEMATIS, *klem' a tis*, the name of a genus of herbs and shrubs belonging to the buttercup family. Both wild and cultivated forms are widely distributed through North



CLEMATIS

America and Europe. Many of the species are of climbing habit and make most attractive vines. In September, when most of the summer flowers have come and gone—

Then the wild clematis comes,
With her wealth of tangled blooms,
Reaching up and drooping low,

and we see the sprays of white or purple starlike flowers gracefully trailing over rocks and fences or swinging from the tops of shrubs. In the cities, the cultivated varieties cover veranda, trellis, and arbor with fragrant white blossoms or large flowers of blue or reddish-purple. The best-known American species is the so-called *virgin's-bower*. When its flowers have gone, the vines are covered with feather-tailed, silky tufts of seed clusters like an "old man's beard," or like "smoky clusters" rising—

"as from fires of sacrifice,—
Sacred incense to the dead!" B.M.D.

Scientific Names. The genus belongs to the family *Ranunculaceae*. The botanical name of the virgin's-

bower is *Clematis virginiana*. One of the first originated and best-known hybrid species is the purple-flowered *C. Jackmani*.

CLEMENCEAU, *kla mahn so'*, GEORGES BENJAMIN EUGENE (1841-1929). This teacher, physician, editor, statesman—the "tiger of France"—was the outstanding character in his country during the World War. Before that time, for a third of a century, he was a powerful influence in French affairs.

He married an American woman while in the United States in his early years. Here he taught a girls' school and practiced medicine. Returning to France in time to witness the Franco-German War and exercise a certain influence as a mayor, he swore that thereafter he should live only to avenge his country's loss of Alsace-Lorraine. Circumstances made him a powerful instrument of his country in the war through which these provinces were restored (1919).

While yet a young man, Clemenceau became editor of *La Justice* and of other papers; the thunder of his editorials was heard throughout Europe, and led in time to a seat in the national Senate, then to the post of Premier of France. In 1900 his Ministry was defeated, but in 1917, in the darkest period of the war, he again became Premier. The fiery old man was thenceforth the inspiration of all France. At the end of the war, he was presiding officer at the peace conference and head of the French delegation. In 1920 he was suggested for the Presidency of France, but was not chosen; Deschanel was the successful candidate. In 1925 Clemenceau's *Autobiography* appeared, and in 1929 *Memoirs of a Victory*.

CLEMENS, *klem' enz*, SAMUEL LANGHORNE (1835-1910). What boy does not count among his treasures *The Adventures of Tom Sawyer* and *Huckleberry Finn*? What man does not look back with real delight to the time when he first read them, and, re-reading them now, find new sources of humor? And even the serious historian finds them of value; for they give very clear, lifelike pictures of life in a bygone day. Written by the most popular American humorist, under the name of MARK TWAIN, they have made their author beloved wherever English is spoken, and have brought good-natured laughter into millions of homes.

Clemens was born in the town of Florida, Mo., on November 30, 1835, and received only the meager education which a little Western

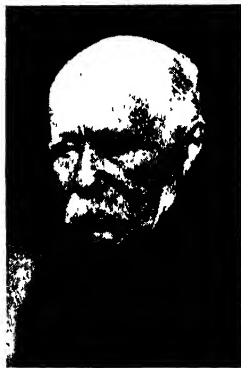


Photo Keystone
CLEMENCEAU

town of those days afforded. At the age of thirteen, he was at work in a printing office, and there, with characteristic zeal, he soon became an expert typesetter. He worked for a time in Saint Louis, New York, and Philadelphia, but the life of the river held a strong fascination for him, and in 1851 he became a steamboat pilot. Every reader of his *Life on the Mississippi* has followed with keen interest his experiences while in this position. It must have been during this time that he chose his pen name, for "Mark twain!" was a frequent call of the sounder, to indicate that the water was two fathoms deep.

When the War of Secession broke out, navigation on the Mississippi practically ceased, and Clemens joined a company of Southern sympathizers who had volunteered in the Confederate ranks, but he saw no actual service.



Photo Brown Bros

SAMUEL L. CLEMENS
Better known to the world
as "Mark Twain."



BOYHOOD HOME IN HANNIBAL, MISSOURI

From a photograph taken several years before his death, on the occasion of a visit "back home."

In Nevada, whither he went with his brother after the war, and later in San Francisco, he worked as a reporter, and readers of the papers for which he wrote had glimpses of his delightful humor, which consisted largely in treating gross exaggerations with absolute seriousness. For a time he was interested in mining, then

he took a trip to the Sandwich Islands (now Hawaiian Islands), and after his return, in 1866, he gradually acquired a reputation as a writer and lecturer. *The Jumping Frog of Calaveras County* and *Innocents Abroad*, the latter an account, exquisitely funny in places, of a trip through Egypt and the Holy Land, won him a more than local reputation and made him prosperous. He married in 1870, and the next year gave up the editorship of the *Buffalo Express*, which he had held for two years, and removed to Hartford, Conn. There the Clemens family remained until 1880, when financial reverses took them to Europe, where living was cheaper. A New York publishing house in which the author was interested failed in 1894, leaving him with a burden of debt. This was entirely paid off by the proceeds of a triumphant lecture tour around the world (1895-1896). In 1900 Clemens and his wife and daughters returned to America. They lived for several years in New York, but the author's last years were spent in a beautiful house which he built in Redding, Conn.

His Name and Memory Honored. Statues in his honor have been erected in his birthplace and in Hannibal, but the most signal tribute to his memory is the 106-acre Mark Twain Memorial Park on the banks of the Salt River, a beautiful stream flowing through the village of Florida. This contains the humble two-room cottage where the author was born, and which has long been a Mecca for thousands of those who have learned to appreciate him "who cheered and comforted a tired world."

Summary of His Works. In addition to the famous books mentioned above, he wrote *A Connecticut Yankee at King Arthur's Court*, satirizing the romantic age of chivalry, a story which later became one of the most successful moving pictures of the day, *Pudd'nhead Wilson*, a serious study of life in a little Missouri town, with some excellent character drawing; *The Prince and the Pauper*, a fantastic tale of what happened when Prince Edward of England changed positions with a beggar boy; *Recollections of Joan of Arc*, and other works. He wrote some things which were not intended to be funny, but the public insisted on looking for humor in everything that came from his pen. He himself was far from being the typical "funny man," but took a deep interest in serious questions, social and political. His vigorous style and mastery of language have been praised by more than one critic, for he was an artist, not merely an entertaining humorist.

CLEMENT, klem' ent, the name of fourteen Popes, of whom the fifth and sixth were Frenchmen and resided at Avignon. Of most importance historically were Clement I, Clement VII, Clement VIII, and Clement XIV.

Clement I, commonly known as Clement of Rome, lived in the first century A.D., and is alleged to have been the third bishop of Rome after Saint Peter. The early Christians felt a reverence for him second only to that in which the twelve Apostles were held,

and his *Epistle to the Corinthians* is an important source of early Church history. For a time, this letter ranked as a part of the Scriptures.

Clement VII, Pope from 1523 to 1534, was of the famous Medici family (see MEDICI). His reign fell during the troubled days of the early Reformation, and his vacillating character led him to take sides with one party after another, until all lost faith in him. The troops of Emperor Charles V sacked Rome in 1527; the Pope was for a time held prisoner in one of his own castles, but was later reconciled to the emperor, whom he urged to take severe measures against the Protestants. Clement's refusal to grant the divorce of Henry VIII of England from Catharine lost England to the Church of Rome (see CATHARINE OF ARAGON; HENRY VIII).

Clement VIII, Pope from 1592 to 1605, was a lover of learning, as was shown by his favors to scholars and the revisions of the Vulgate, the breviary, and the liturgical books which he caused to be made; a man of sincere piety, as his daily confessions bear witness; and an apostle of peace rather than war, for he led in the mediations which resulted in the Peace of Vervins between France and Spain. It was he, too, who reconciled the great Henry IV of France with the Church. See VULGATE.

Clement XIV, the last of the name, was Pope from 1769 to 1774. Because of his support of the Jesuits, he met with determined opposition in most of the Roman Catholic countries of Europe, and finally was compelled to sign a brief suppressing the Order. He was not only a statesman of ability, but a scholar as well, and was the founder of the Clementine Museum in the Vatican. See JESUITS.

G. W. M.

CLEMSON COLLEGE. See SOUTH CAROLINA (Education).

CLEOBULUS, *kle o bu' lus*. See SEVEN WISE MEN OF GREECE.

CLEOPATRA, *kle o pa' trah*, the name borne by several Egyptian queens, the most famous of whom was CLEOPATRA VI, daughter of Ptolemy Auletes, and one of the most celebrated rulers the world has ever seen. Her beauty influenced the policies of the greatest men of her day. Blaise Pascal (1623-1662), in *Thoughts*, said, "If the nose of Cleopatra had been shorter, the whole face of the earth would have been changed." See illustration, page 1466.

She was born in 69 or 68 B.C., and in 51 B.C. reached the throne on the death of her father. Her brother, Ptolemy, then twelve years old, was made joint ruler with her, and his advisers soon succeeded in seizing all the power and driving Cleopatra from the kingdom. She collected an army in Syria, but met with no success until Caesar, visiting Alexandria and

falling a victim to her personal charms, took up her battles for her. Her brother was defeated and killed, and a younger brother, also called Ptolemy, was placed on the throne with her. In 46 B.C. Cleopatra went to Rome, and she remained there as Caesar's mistress until his death in 44 B.C.

On her return to Egypt, she had her brother put to death, that her son Caesarion, whose father was Caesar, might become her heir. In 42 B.C., after the Battle of Philippi, she

had her momentous first meeting with Mark Antony at Tarsus. She had arrayed herself for conquest, and Antony promptly fell in love with her and followed her back to Egypt. There he lived for some time, and although obliged to return to Rome, he hastened back to Alexandria as soon as possible, and gave himself up to pleasure and revelry with her. He divorced his wife Octavia, sister of Octavius, for her, and thus hastened the war with Octavius which culminated in the Battle of Actium.

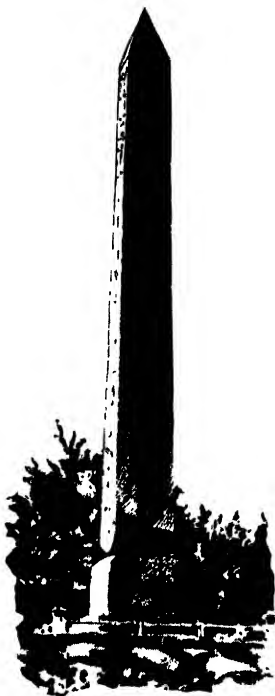
Cleopatra had brought her fleet to aid Antony, but believing that he was being defeated, she fled with her ships, and Antony followed her. She let the report reach him, on the approach of Octavius, that she had committed suicide, and he took his own life; but she tried to make herself safe, as she had done before, by bringing Octavius under the spell of her fascinations. This time she was unsuccessful, and rather than be led in triumph to Rome, she killed herself, by what method is not known, though tradition declares that she placed an asp on her

arm and died of its bite. This is doubted, for such a death would have disfigured her skin, and her vanity would have revolted at marring her beauty. Poisons were plentiful and their effects were understood; the best opinion declares such a means probably was employed. [See illustration, page 1466.]

Related Subjects. The reader is referred in these volumes to the following articles:

Actium	Augustus	Octavia
Antony, Mark	Caesar, Julius	Ptolemy (XIV)

CLEOPATRA'S NEEDLES, the name given to two magnificent Egyptian obelisks of red syenite which were presented in 1877 by Ismail Pasha, the khedive of Egypt, to the governments of Great Britain and the United States, respectively. One was set up on the London Embankment in 1878; the other stands



CLEOPATRA'S NEEDLE
In Central Park, New
York City.



From the painting by A. Cabanel

CLEOPATRA NOTING THE EFFECT OF POISON UPON ONE OF HER SLAVES

in Central Park, New York, having been transported to the United States in 1880. The latter is sixty-nine feet high and seven and one-half feet thick at the base, and weighs 200 tons. It rests on four bronze bases, the originals of which are in the Metropolitan Museum of Art, a few rods to the east. The sides of the obelisk are covered with hieroglyphics, and bear inscriptions of Thothmes III (about 1500 B.C.) and Rameses II. These obelisks originally stood before the Temple of the Sun at Heliopolis, whence they were removed to Alexandria, in 14 B.C.

Restoring the Obelisk. Although the obelisk had stood undamaged in the dry climate of Egypt for more than 3,000 years, the moist salt air of New York has damaged its surface. Efforts were made some years ago to protect it, but now many of the hieroglyphics have been obliterated. See **OBELISK**; **THOTHMES III**.

CLEPSYDRA, *klep' si drah*. See **CLOCK**.

CLERESTORY, *kleer' sto rie*. See **ARCHITECTURE**.

CLERMONT, the first American steamboat. See **FULTON, ROBERT**.

CLERMONT, COUNCIL OF. See **CRUSADES** (First Crusade).



CLEVELAND, [STEPHEN] GROVER (1837-1908), the twenty-second and twenty-fourth President of the United States, the first Democrat after the War of Secession to hold this office, and the only President who has served two terms not in succession. Probably no other President was more consistent, more courageous in his convictions, and for a time more unpopular. Cleveland was physically large and heavy, and like many men of his build, was calm and deliberate in his judgments, but once his mind was made up, he was not swayed by public clamor. He was obstinate, but always for reasons of conscience.

Yet it must not be imagined that Cleveland could not feel the public pulse. He may have been indifferent, but he was not deaf to public opinion. And there were times when he presented an issue to the public in such a form that his words are still quoted. He was not an orator, but he could phrase his statements in crisp, telling form. When he said that "Public office is a public trust," everybody understood him.

His Youth. Cleveland was born on March 18, 1837, at Caldwell, Essex County, N. J., where his father was pastor of the Presbyterian church. The son was christened Stephen Grover, but he dropped the name Stephen before he reached manhood. After 1841 the family lived first at Fayetteville, N. Y., and later at Clinton, N. Y. Grover was sixteen years old and was preparing to enter Hamilton College, when his father died. He went to work to help support his mother and sisters, and for a year taught in the Institution for the Blind

at Batavia. He then felt, however, that the West offered him greater opportunities, and in the autumn of 1855 he borrowed twenty-five



Photo: Brown Bros.

GROVER CLEVELAND

From a photograph taken the year before his death.

dollars and set out for Cleveland, Ohio. He got no farther than Buffalo, where an uncle

persuaded him to remain and soon found him a position as clerk in a law office.

In Law and Politics. Almost immediately after his admission to the bar, in 1859, Cleveland became conspicuous in local politics, and in 1863 was appointed assistant district attorney for Erie County, of which Buffalo is the chief city. Two years later, he was the unsuccessful candidate for district attorney, but in 1870 was elected sheriff. In this office, which he held for three years, he displayed at least one trait which was characteristic of him throughout his career. Because he believed that a public official should perform the duties for which he was elected, he personally sprang the trap that hanged a convicted criminal rather than delegate this duty to a deputy. At the end of his term, he resumed the practice of law, and was soon recognized as one of the leaders of the bar in Western New York.

The decade following the War of Secession was a period of political corruption and confusion, and of extravagance in public and private life. Cleveland's appearance in public life nearly coincided with the beginning of a reaction against the looseness of morals which had been apparent during these years. Cleveland, as sheriff, had displayed an honesty and devotion to duty which led to his nomination and election, in November, 1881, as mayor of Buffalo on a reform ticket. In a year, Buffalo

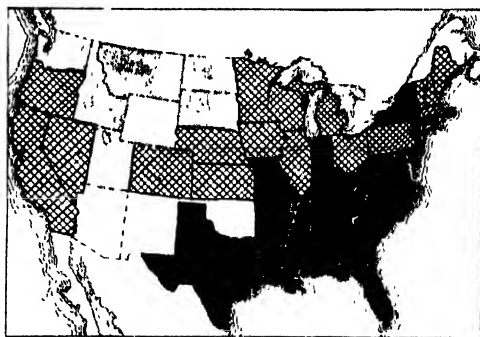
experienced little less than a revolution, for its mayor was a man who went on his course without regard to "influence." A year in the mayor's office won him the Democratic nomination for governor of New York. His opponent was Charles J. Folger, President Arthur's Secretary of the Treasury, a man of great ability, but unfortunate in that the people of New York thought he was being forced upon them by "machine" politics. Cleveland was elected by a plurality of 192,800 votes—an unprecedented victory in those times. As governor, Cleveland continued to show the same fearless independence which had characterized his course as mayor of Buffalo. He kept a watchful eye on many details of administration which governors usually neglect. It is said that he never signed a bill until he had read it through; he accepted nobody's interpretation of it, but always relied on his own judgment. He vetoed so many bills that he was often called the "veto governor." He offended Tammany, the labor element, and many others. Nothing better showed his disregard of public clamor than his veto of a bill which provided lower rates of fare on the elevated railroads of New York City. The object of the bill met his approval, but not the method. Nevertheless, he won a large personal following, simply because he was fearless and independent.

Cleveland's Career as President

The Election of 1884. Cleveland's terms as mayor of Buffalo and governor of New York made him a national figure. As the time for the campaign of 1884 approached, he was recognized as the leading candidate for the Democratic nomination, and at the national convention in Chicago was nominated practically without opposition. The Republicans nominated James G. Blaine, one of the most brilliant men in public life and one of the most popular. Yet Blaine had many enemies, and thousands of Republicans refused to vote for him. It was this element, called *Mugwumps*, that turned against Blaine and elected Cleveland. The campaign was one of the bitterest in the history of the United States. Blaine attempted to keep alive the issues of the War of Secession and reconstruction, but the campaign proved that they were dead. The real contest was personal, and was marked by charges against the characters of both Cleveland and Blaine. When friends of Cleveland asked him how they should answer the charges against him, he said, "Tell the truth!" The election was close; the result was not known for three days, until the official count gave Cleveland a plurality of fewer than 1,500 votes in New York state. New York's vote gave Cleveland a plurality of

thirty-seven in the electoral college. Cleveland's popular vote was 4,912,696, against 4,840,680 for Blaine.

First Administration (1885-1889). His term of office was in many respects notable. It was



ELECTION OF 1884

States shown in black were Democratic; cross-lined, Republican; light shaded, non-voting territories.

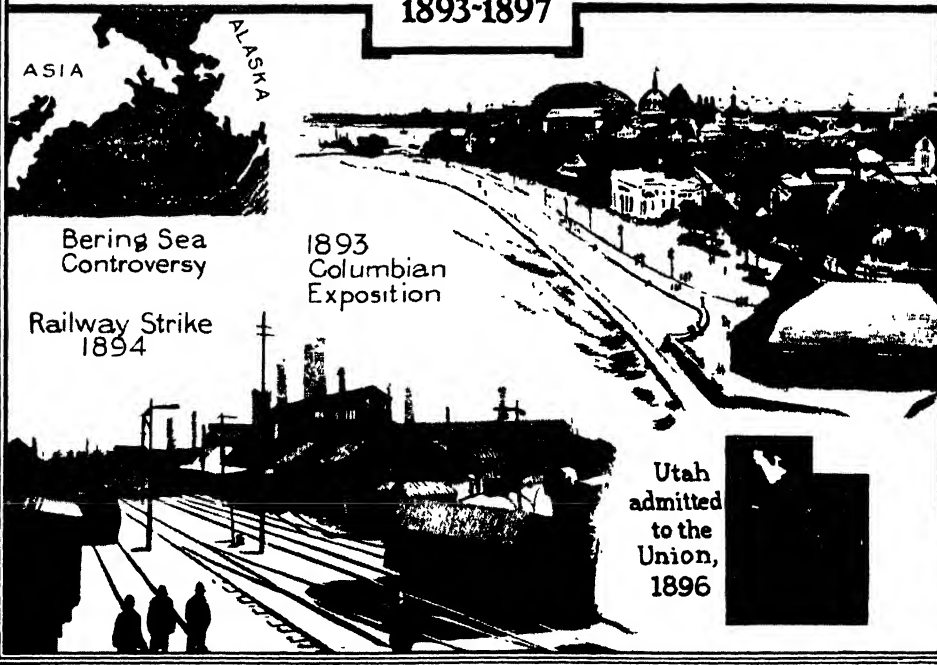
apparent from the first that Cleveland was prepared to take, and even insisted on taking, the entire responsibility of the administration. He showed his independence at the start by refusing to make wholesale removals of Re-



1885-1889

ADMINISTRATIONS *of* CLEVELAND

1893-1897



publican office-holders. Although he made enough changes to incur the disapproval of reformers, his administration marked a great advance in civil service. He applied the principles of the Civil Service Act of 1883 to many offices not specifically mentioned in the act; and during his term in office added nearly 12,000 offices to the classified service.

Vigorous Use of the Executive Power. During his term, Cleveland frequently proved his independence. He became involved in a quarrel with the Senate, in which the Republicans were in the majority, because he refused to give his reasons for removing certain officers. The Senate's consent was necessary to their appointment, but when the Senate demanded that the President make public the documents on which he based their removal, he laid down the principle that a President's papers were not subject to the order of Congress. In other ways he maintained the dignity of the Chief Magistrate. He prevented a rebellion among the Mormons by concentrating troops at Salt Lake City. In a dispute over Canadian fisheries, he threatened to prohibit importation from Canada except over American-owned railways, and he dispatched 3,000 marines to the Isthmus of Panama to quell an insurrection which threatened loss of American lives and property. During his term, he vetoed over 400 bills sent to him by Congress. Nearly two-thirds of these were private pension bills, but the most important of all the vetoed bills was the Dependent Pension Bill, whose indefinite terms would have opened the way to endless confusion. Cleveland's frequent use of the veto power gave him the nickname of the "Veto President."

Labor Troubles. During the whole of this period, the United States was disturbed by labor troubles. There were many strikes in different parts of the country, and relations between labor and capital were generally unsatisfactory. The Knights of Labor, an organization founded in 1869 on the principle that "the injury of one is the concern of all," increased its membership from about 100,000 in 1885 to more than 700,000 in 1886. The number of strikes in 1886 was more than double the number in 1885. In one of the strikes, affecting the Gould system of railways, 6,000 miles of railway were tied up, and a great strike at the McCormick harvester plants in Chicago had its climax in the famous Haymarket Riot [see CHICAGO (History)]. President Cleveland, in a message to Congress, advocated an arbitration commission to settle industrial disputes, but Congress took no action.

Important Legislation. Although the Democrats in the Senate of the United States during the whole of his term were in the minority, Cleveland's administration was noteworthy for the enactment of a number of important laws.

First of these was a contract-labor law, prohibiting the importation of alien laborers under contract. Other important acts were the Presidential Succession Act of 1886; a new Anti-Polygamy law, in 1887, dissolving the Mormon Church as a corporation and strengthening preceding statutes aimed at polygamy; the Electoral Count Act of 1887, which made the states the final judges in controversies concerning the election of Presidential electors, and thus was aimed to prevent disputes like that of 1876; and the Chinese Exclusion Act, in 1888, which forbade further Chinese immigration. More important than any of these was the Interstate Commerce Act of 1887, placing the railways and other common carriers under the control of a Federal commission. During the last months of Cleveland's administration, Congress voted to establish a Department of Agriculture, and also passed an enabling act for the admission of North Dakota, South Dakota, Montana, and Washington to the Union.

Local and Miscellaneous Events. One of the most interesting events of these years was the dedication of the Statue of Liberty in New York Harbor, in 1886. The New Orleans Cotton Exposition in 1885 and the destruction of Charleston, S. C., by an earthquake in 1886 are also noteworthy.

The election of Cleveland in 1884 showed that the old political issues raised by the War of Secession were dead. As if to bear witness to this fact, during Cleveland's term occurred the deaths of many of the men who had been leaders during or immediately after the war. Among these famous men were U. S. Grant, George B. McClellan, Philip H. Sheridan, John A. Logan, Winfield S. Hancock, Samuel J. Tilden, Horatio Seymour, Roscoe Conkling, and Cleveland's predecessor in the Presidency, Chester A. Arthur.

The Tariff and the Presidential Election of 1888. For a number of years the United States government had faced the problem of an increasing surplus in the treasury. During Arthur's administration, several attempts were made to reduce the surplus by appropriations, many of which were wasteful. In a special message to Congress in December, 1887, Cleveland pointed out that the increasing surplus showed that the scale of taxation was excessive, and recommended sweeping reductions in the import tariffs. The Mills Bill, which passed the House of Representatives, was a low-tariff measure, estimated to reduce the revenues by \$50,000,000 a year. The Republican Senate amended it so that it became a high protective measure, which the House refused to accept.

The failure of this tariff, however, placed the issue squarely before the country in a Presidential election year. The tariff was the chief issue in the campaign. Cleveland was

renominated, and to oppose him the Republicans chose Benjamin Harrison of Indiana. Cleveland received a plurality of 96,000 in the popular vote, but Harrison carried New York and thus had a majority in the electoral college (233 to 168) and was elected.

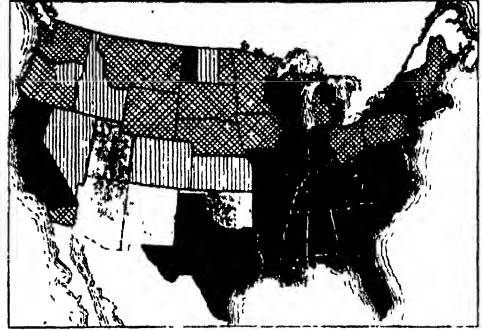
An Interval in Private Life. In 1886 Cleveland married, at the Executive Mansion, Miss Frances Folsom, the daughter of a former law partner in Buffalo. At the end of his term, he moved to New York City and there practiced law. When he went out of office his political career seemed ended, but by 1892 the McKinley tariff law and other Republican measures led to a change in public feeling. In spite of the opposition of the Democratic leaders of New York, his own state, he was again nominated for President, and was re-elected over Harrison by an electoral college vote of 277 to 145, and a plurality of 364,000. At this election, for the first time since the election of 1860, more than two candidates received electoral votes. General James B. Weaver of Iowa, a Populist, received twenty-two votes.

Second Administration (1893-1897). Cleveland's second administration was one of the most remarkable in the history of the United States. He entered office free from pledges; the office had sought him. Naturally independent and sometimes lacking in tact, he now paid little attention to the feelings of other men, and probably no other President ever did things more unpopular at the time. For the first time since Buchanan's administration, the Democratic party was in control in the White House and in both houses of Congress. But at the outset, Cleveland antagonized a large section of his party by his stand on the silver issue. In the summer of 1893, the country suffered from a severe panic, and the government's gold reserve fell far below the danger point. The United States was actually, though not knowingly, on the verge of inability to redeem its notes in specie.

Cleveland faced the issue squarely; he called Congress in special session, and after a bitter fight forced the repeal of the Sherman Silver Purchase Act of 1890. That act, by requiring the government to buy a large amount of silver each month, was exhausting the gold reserve. Cleveland, through Secretary of the Treasury Carlisle, sold for gold several bond issues to a syndicate of New York bankers, in order to keep the gold reserve at a point where it was enough to redeem the government's paper currency. He was severely criticized for allowing the bankers a large profit, and a later bond issue was sold by public subscription. The effects of the panic, however, were apparent for several years, until about 1897.

One of the principal results of the business depression following the panic was a series of

labor troubles, which culminated in a great railway strike in 1894. Everywhere there was discontent among the laboring classes; thousands were out of work, and strikes were frequent. The closing of the Pullman Company's shops at Pullman, Ill., led to a general strike of the



ELECTION OF 1892

States shown in black were Democratic; oblique shaded, Republican; perpendicular shaded, Populist; light shaded, non-voting territories.

railway employees on practically all of the lines running east of Chicago. Chicago was the center of the trouble, and rioting and destruction of property were ordinary events of the day. As the governor of Illinois, John P. Altgeld, refused to call out the militia to preserve order, the President on his own initiative sent Federal troops to Chicago to protect the mails and incidentally to suppress rioting. This action caused sharp controversy, because Altgeld insisted that the President had no right to order out Federal troops for service in a state, except at the request of the governor.

In the midst of the panic and depression, Cleveland urged a revision of the tariff in accordance with the Democratic campaign promises. The Wilson Bill, framed in the House according to the President's suggestion, was so materially altered in the Senate that Cleveland refused to sign it. He allowed it to become a law (1894) without his signature, but issued a statement criticizing some of the Democratic Senators who had not supported their party. This split in the Democracy was followed by Republican victories at the polls in November, 1894, and for the last two years of his term the new Republican majority prevented Cleveland from securing any important legislation.

In his foreign policy, Cleveland was no less energetic and firm than at home. Almost his first act in 1893 was to withdraw from the Senate the Hawaiian annexation treaty negotiated in Harrison's administration. He secured a treaty with China which marked the beginning of the "open door" policy. But perhaps his greatest act, which has left the deepest impress on American history, was his famous

Venezuela message, sent to Congress on December 17, 1895. Cleveland's Secretary of State, Richard Olney, had urged Great Britain to arbitrate its dispute with Venezuela over the British Guiana-Venezuela boundary, but Great Britain insisted that the Monroe Doctrine did not apply to the issue. Thereupon Cleveland sent a brief message, in which he declared that the Monroe Doctrine was the vital issue at stake, and intimated that the United States would go to war to maintain it. The excitement in Great Britain and the United States grew intense, but after several diplomatic exchanges the English government agreed to arbitrate the boundary dispute; this was accomplished to the satisfaction of all concerned.

The Private Citizen

The Venezuela message was Cleveland's last important act as President. When he retired to private life, in 1897, there was probably no more unpopular man in the United States. He had offended his own party by his stand on the silver and tariff issues; he had won the enmity of labor by his action during the strike; he was even disliked by the bankers and financiers because his Venezuela message had upset the stock markets. Yet Cleveland was fortunate enough to outlive the bitterness of these years, and long before his death he was universally respected and recognized as one of the greatest of the Presidents. The policies for which he had fought and had been jeered at were carried out by his Republican successors. And even his few mistakes were excused in the light of his undoubted honesty of purpose. From 1897 until his death, he made his home in Princeton, N. J., where he took an active interest in the university, especially the graduate school. He was a lecturer and a trustee of the university for ten years, and the beautiful tower of the graduate school is a memorial to him.

In 1905, following the exposure of insurance scandals in New York, Cleveland became one of the trustees of the Equitable Life Assurance Society, one of the largest insurance companies in the United States. Nothing is better testimony to Cleveland's reputation than the renewal of public confidence in this and other companies after he assumed this responsibility.

Other Items of Interest. A Republican of high standing, who opposed Cleveland in many ways, declared that his treatment of the Venezuela question was "the most signal victory of American diplomacy in modern times."

During his second Presidential candidacy, Cleveland was referred to by his opponents as "The Perpetual Candidate" and "The Stuffed Prophet."

The lectures delivered during his latter years at Princeton University were published as *Presidential Problems*.

The hero of Paul Leicester Ford's *The Honorable Peter Stirling* is in part a characterization of Grover Cleveland.

Cleveland could not enlist during the War of Secession, for two of his brothers were in the army and he had to work hard to support his mother and sisters. But he borrowed money to hire a substitute, and was unable to repay the loan until long after the war was over.

The Indians of the Oklahoma country had been deprived of many of their rights and much of their territory by white settlers, but Cleveland compelled the latter to withdraw and even to tear down the fences which they had hurriedly constructed to mark their "claims."

At the great memorial meeting which was held for Cleveland, his personal friend, Richard Watson Gilder, read a poetic eulogy, in which occurred the following lines, which give a true picture of the man:

Thou brave and faithful servant of the State,
Who labored day and night in little things,
No less than large, for thy loved country's sake,
With patient hand that plodded while others slept!

His manner of speaking was delightfully informal, and his powers of mimicry were so great that Joseph Jefferson declared that he had missed his calling and should have been an actor.

Almost the last words he spoke were, "I have tried so hard to do right."

A B H

Frances Folsom Cleveland (1864-), the "White House Bride," was the first woman to marry a President in the White House. She was so universally admired and beloved that the fact that President Cleveland spent a year in office as a bachelor is usually forgotten. During that year, the mistress of the White House was the President's sister, Rose Elizabeth Cleveland, famous in her own right as a lecturer and writer, and a popular and graceful hostess.

Frances Folsom was the daughter of Oscar Folsom, Cleveland's law partner in Buffalo; after her father's death she was Cleveland's ward. He married her at the White House in 1886. The difference of a quarter century in their ages did not prevent their marriage from being ideally happy. The beauty and charm of Mrs. Cleveland, as well as her romantic marriage, endeared her to the public, no action or word of hers appeared too unimportant to merit attention in the press. The working women who attended her famous Saturday receptions were met with the same pleasure and tact displayed before women of high official rank.

Five children were born to the Clevelands; the second daughter, Esther, was born in the White House, in 1893. In 1913, five years after the ex-President's death, his widow married Thomas J. Preston, Jr., a professor at Princeton University.

Related Subjects. The reader who seeks additional information with respect to this President and his times is referred in these volumes to the following articles:

Blaine, James G.
Interstate Commerce Act
Mugwumps

Presidential Succession
Tariff
Venezuela (History)



FRANCES FOLSOM
CLEVELAND

Photo U. S. A.

OUTLINE AND QUESTIONS ON GROVER CLEVELAND

Outline

I. Years of Preparation

- (1) Birth and parentage
- (2) Education
- (3) Removal to the West
- (4) Practice of law

II. Early Political Career

- (1) As sheriff
 - (a) Serious conception of his duties
- (2) As mayor of Buffalo
 - (a) Financial reform
- (3) As governor of New York
 - (a) The veto governor
- (4) The election of 1884

III. First Administration

- (1) The Cabinet
- (2) Legislation
 - (a) Contract labor law
 - (b) Presidential Succession Act, 1886
 - (c) Anti-Polygamy law, 1887
 - (d) Electoral Count Act, 1887
 - (e) Chinese Exclusion Act, 1888
 - (f) Interstate Commerce Act, 1887
- (3) Other governmental affairs
 - (a) Advance in civil service
 - (b) Controversy between President and Senate
 - (c) Troops sent to Salt Lake City

- (d) Marines sent to Panama
- (e) States admitted
- (4) Miscellaneous events
 - (a) Haymarket Riot in Chicago
 - (b) Other labor troubles
 - (c) Arrival of Statue of Liberty
 - (d) New Orleans Cotton Exposition
 - (e) Destruction of Charleston
- (5) Election of 1888

IV. Second Administration

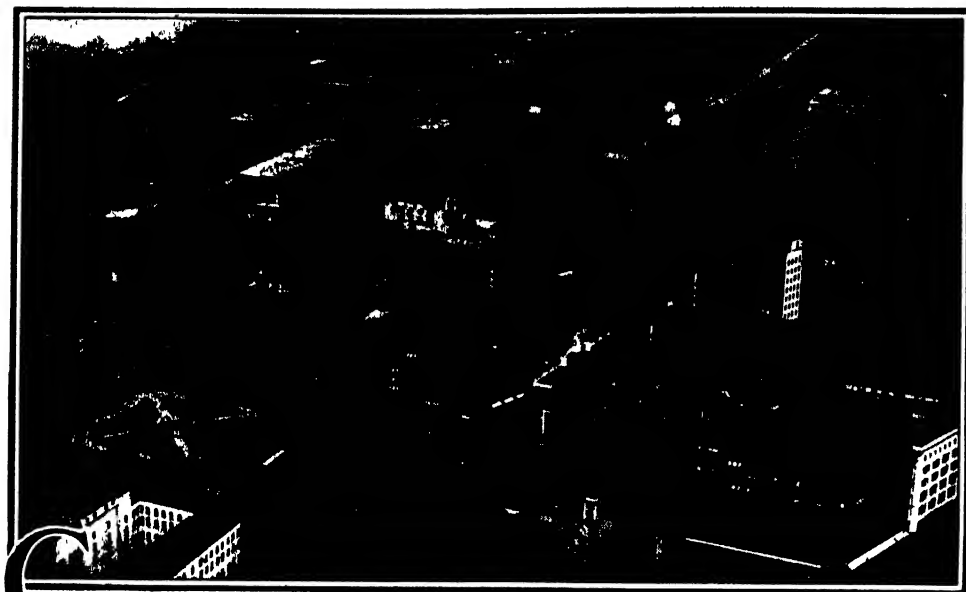
- (1) Election of 1892
- (2) Legislation
 - (a) Sherman Silver Purchase Act repealed
 - (b) Tariff revision
- (3) Foreign affairs
 - (a) Hawaiian annexation treaty withdrawn
 - (b) Treaty with China
 - (c) Venezuela message
- (4) Other events
 - (a) Financial panic
 - (b) Labor troubles
 - 1 Troops sent to Chicago
 - (c) World's Columbian Exposition
 - (d) Utah admitted

V. After Retirement

- (1) Later life
- (2) Character

Questions

- What words, spoken shortly before his death, summed up his aim in life?
- How did Cleveland manage to displease both the civil-service reformers and the "spoils system" advocates?
- What led to his nomination in 1892?
- What significance had the fact that he once sprang the trap and hanged a criminal in showing his attitude toward public office?
- What was the most important legislation of his first Presidential term?
- How many Presidents have served two terms not consecutively?
- What was the Sherman Silver Purchase Act, and why was it repealed?
- What were "Mugwumps," and what part did they have in determining the career of Cleveland?
- How did the public attitude toward Cleveland at his death differ from the attitude toward him when he went out of office?
- What is regarded as his greatest act?
- Why did not Cleveland fight in the War of Secession? What did he do instead?
- What was the Haymarket Riot?
- How did the President incur the enmity of a governor of Illinois?



CLEVELAND, OHIO, the largest city in the state and the county seat of Cuyahoga County, is the sixth city in population in the United States and one of its principal manufacturing and trading centers. Cleveland's rapid growth and consistent prosperity owe much to its location on a site where rail and water routes have a natural junction, and at a point accessible to the iron ore of the Lake Superior region, the products of the grain belt, and the coal and oil of Ohio, Pennsylvania, and West Virginia. The city is situated on the southern shore of Lake Erie, on a natural inner harbor formed by the mouth of the Cuyahoga River. It is thus directly on the line of the Great Lakes traffic; furthermore, lying, as it does, in almost the same latitude as Chicago, 339 miles to the west, and New York, 576 miles to the east, it is on the through rail and airplane routes between the populous markets of the East and the Middle West. These factors of location have had a major share in the stimulation of manufacturing and commerce.

Cleveland's development, however, has not been restricted to the commercial and the industrial. In civic accomplishments, the city has a record of achievements of which it may well be proud, not only in connection with city planning, but in the difficult field of municipal government, and in social welfare and education.

Briefly Stated. Below are summarized a few of the notable statistical facts relating to Cleveland. Where figures are subject to slight changes from year to year, they must be regarded as approximations.

Area, 71 square miles.
 Auditorium (public), capacity of, 12,500
 Banks, 22; capital, \$50,425,000.
 Bank deposits, \$840,000,000
 Boulevards and driveways, municipal, 40 miles
 Breakwater, 5½ miles.
 Capital invested in manufacturing, \$762,000,000
 Churches, 410.
 City airport, 1,000 acres.
 Export trade, annual, \$300,000,000
 Freight receipts (exclusive of ore), 25,000,000 tons
 Frontage on Lake Erie, 14 2 miles
 Gas mains, 1,000 miles.
 Manufacturing plants, over 2,400; yearly payroll, \$217,000,000.
 Parks, municipal, 3,640 acres
 Parks of metropolitan area, 15,000 acres
 Percentage of industries classified by the United States census, 83.
 Schools, public, 166; teachers, 4,562. Parochial schools, 123; teachers, 1,092.
 Sewers, 1,050 miles.
 Street railway system, 1,600 cars, 418 miles of track, 500,000,000 passengers yearly.
 Streets, mileage of, 1,105.
 Water mains, 2,240 miles.
 Water consumption, including suburbs, 161,000,000 gallons daily; eight pumping stations, with 900,000,000 gallons daily capacity.

Population. At the 1920 census, Cleveland's population had grown to 796,841, increasing to that number from 4 within a period of 124 years. The city was then the fifth largest in the United States, but in the next decade Los Angeles forged ahead and Cleveland dropped to sixth place, without, however, losing its rank in manufacturing and commerce. Since 1880 the city has doubled its population every twenty years. In 1928, according to Federal estimate, the population was 1,010,300; that

of Greater Cleveland, including adjoining suburbs, was estimated at 1,150,000. Over one-third of the inhabitants are foreign-born; these are made up chiefly of Germans, Slavs, Hungarians, Russians, Irish, and Italians.

General Description. The city occupies an attractive site of seventy-one square miles, on a bluff rising about a hundred feet above the lake level. It is divided into an East Side and a West Side by the deep, winding valley of the Cuyahoga. The land along the lower reaches of the river, called the Flats, provides excellent sites for factories, lumber yards, docks, and other industrial properties, and this section of the stream forms the inner harbor. Behind a breakwater half a mile out, the outer harbor extends along the shore of the lake for nearly six miles. The floor of the Cuyahoga Valley and the ravines made by several small tributaries, or runs, have been utilized by the railroads as roadbeds, because of their easy grades and convenience as approaches and exits. The plateau above the Flats, fairly level except where it is gullied by the creeks that have cut their way through to the river, is the site of the principal business and residential sections of the city proper. Girdling this plateau are the hills and valleys of a highland region belonging to the Alleghany Plateau.

Principal Thoroughfares. The business activities of Cleveland center about the Public Square, from which the principal streets of the East Side radiate. This square, formerly called Monumental Park, is divided into four sections by Ontario and Superior avenues, these streets intersecting in the center. Superior Avenue continues eastward beyond the city limits, and westward to the rim of the river valley. At this point, the High Level Bridge spans the river and connects with Detroit Avenue on the west. This bridge is a double-deck concrete structure, the largest of several city viaducts; its center span, ninety-five feet above the lake level, affords mast clearance for the tallest vessels.

Besides Superior, the principal arteries leading from the business center to the outer sections of the East Side are Saint Clair, Euclid, Carnegie, Cedar, and Woodland avenues, and Broadway. On the West Side, Lorain, Detroit, and Franklin avenues and West Twenty-fifth Street are important thoroughfares. Of all these the best-known is Euclid Avenue, a broad street extending from the Public Square to the suburbs on the northeast. Originally an Indian trail, it was reclaimed from brushwood and forest, and laid out with such generous proportions and such mathematical precision, that it was named for the Greek father of geometry. In time it became the most beautiful residence street in the city, if not in the country, but today is given over to business houses, except in the eastern end.

Cleveland, however, does not lack handsome residential streets. Abundant growths of trees and shrubbery are so characteristic of its avenues that it is called the *Forest City*. Among its most attractive home streets are Lake Shore and East boulevards, Magnolia Drive, Bellflower Road, Juniper Drive, and Clifton Boulevard. On the rolling hills that form the highland rim about the city are many fine suburban communities, threaded by spacious drives. Cleveland Heights and Shaker Heights are typical of these desirable suburbs.

Parks and Parkways. With more than forty miles of driveways and a score of parks, Cleveland's park system covers 2,475 acres. Deep ravines, sparkling waterfalls, and picturesque combinations of lake and woods give the parks the charm of natural beauty; while children's playgrounds, tennis courts, ball grounds, lagoons, swimming pools; and beach equipment make them delightful recreation centers. The city is also developing a Metropolitan Park District covering about 15,000 acres of parks and roadways and embracing the finest scenery of the surrounding region.

One of the most attractive sections of the city system is the chain of parkland beginning at Gordon Park, which lies at the point where Doan Brook flows into the lake. The picturesque Doan Valley, presented to the city by John D. Rockefeller, has been converted into a narrow park about four miles long; as Rockefeller Parkway, it connects Gordon and Wade parks, both of which are notable for their beautiful landscapes. Overlooking Wade Park is the Museum of Art, in a lovely setting of shrubbery, trees, and water. Other parks include Edgewater, on the lake shore, west of the river; Brookside Park and Zoological Gardens, on Fulton Road at Denison Avenue; and Woodland Hills, half a mile south of Wade Park. Among the larger reservations outside the city limits are Shaker Heights, Garfield, and Clifton parks.

Public and Business Buildings. In its scheme for the grouping of the public buildings, the city-plan commission gave Cleveland a civic center that is admired the country over. These buildings are arranged around the Mall, a T-shaped tract of 104 acres, extending from Superior Avenue to the lake front. Structures already completed are the Cuyahoga County Court House, the United States Postoffice and Custom House, the City Hall, the Public Auditorium, and the Cleveland Public Library. Still to be erected is the Criminal Courts Building. A Union Passenger Station, originally planned for the Mall, has been constructed on the southwest side of the Public Square.

The Terminal group will be a city within a city, and the reported cost of the entire enterprise will be approximately \$200,000,000. The Terminal Tower, already completed, is the

focal point of the group. It is fifty-two stories in height, and measures 708 feet from the station concourse to the top. It is at present the second tallest building in the world. The station itself will provide initially thirteen tracks and six platforms for steam railroads, and six tracks and seven platforms for commuter and rapid transit, with ample space reserved for later expansion as required. The Terminal will be completely electrified.

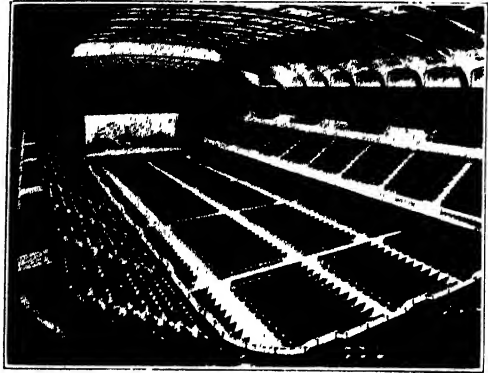
Numerous massive office and bank buildings give the city a metropolitan appearance. Especially characteristic of downtown Cleveland is the arcade type of architecture used for many of the buildings housing shops and offices. The city is the center of the Fourth Federal Reserve District, and its bank headquarters for the district, at Superior and East Sixth, is an imposing structure erected at a cost of \$7,500,000. At East Ninth and Euclid is one of the largest bank buildings in the world, twenty-one stories high and covering 95,000 square feet of land space. In Cleveland, too, is the first labor cooperative bank established in America, the property of the Brotherhood of Locomotive Engineers. The bank is housed in a twenty-story building.

Institutions. Western Reserve University (which see), one of the older collegiate institutions in the Middle West, occupies a beautiful site in the Wade Park district. Near by is the Case School of Applied Science. These institutions and the Catholic John Carroll University, formerly Saint Ignatius College, are the chief seats of higher education in Cleveland. The Museum of Art, whose collections are housed in a handsome building of Georgian marble, maintains a comprehensive educational program and works in cooperation with the city Board of Education. The Museum of Natural History does much to encourage the study of natural science, and is open free every day. A third museum, that of the Western Reserve Historical Society, is a treasure house of Cleveland relics and documents. Besides the Public Library, with its many branches, the city has a considerable number of special libraries.

The Medical Center at University Circle is part of a great educational and cultural development. The Center will consist of the following buildings: Lakeside Hospital, \$3,600,000; Nurses' Dormitory, \$1,600,000; Rainbow Hospital, \$600,000; Western Reserve University Medical School, \$2,250,000; Western Reserve University Nursing School, \$750,000; Babies' and Children's Hospital, \$1,125,000; Maternity Hospital, \$1,500,000; Allen Memorial Library, \$600,000; Pathological Institute, \$750,000; and the Private Pavilion, \$800,000. Money has been provided, by public subscription, for the entire group; the Rainbow, Babies' and Children's, and Maternity hospi-

tals, the Medical School, and the Library have already been constructed.

The social welfare work is unusually well organized. The Cleveland Community Fund, subscribed to by citizens, covers all charitable efforts. The Boys' Farm, twenty-two miles from the city, is controlled by the city and has a powerful influence for good among the unmanageable boys sent from the Juvenile Court.



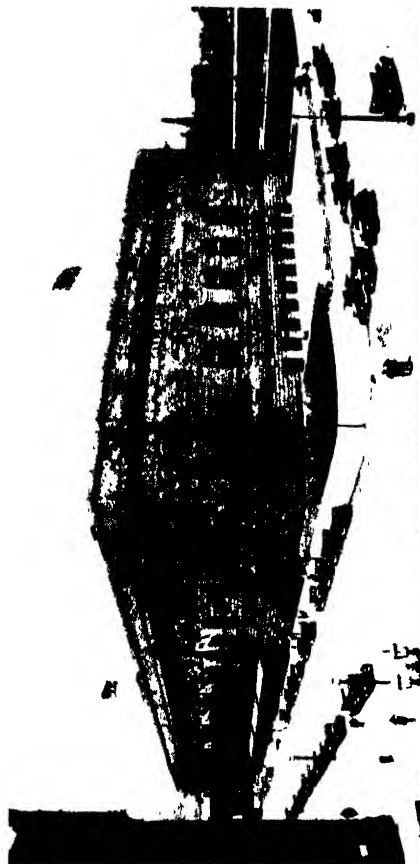
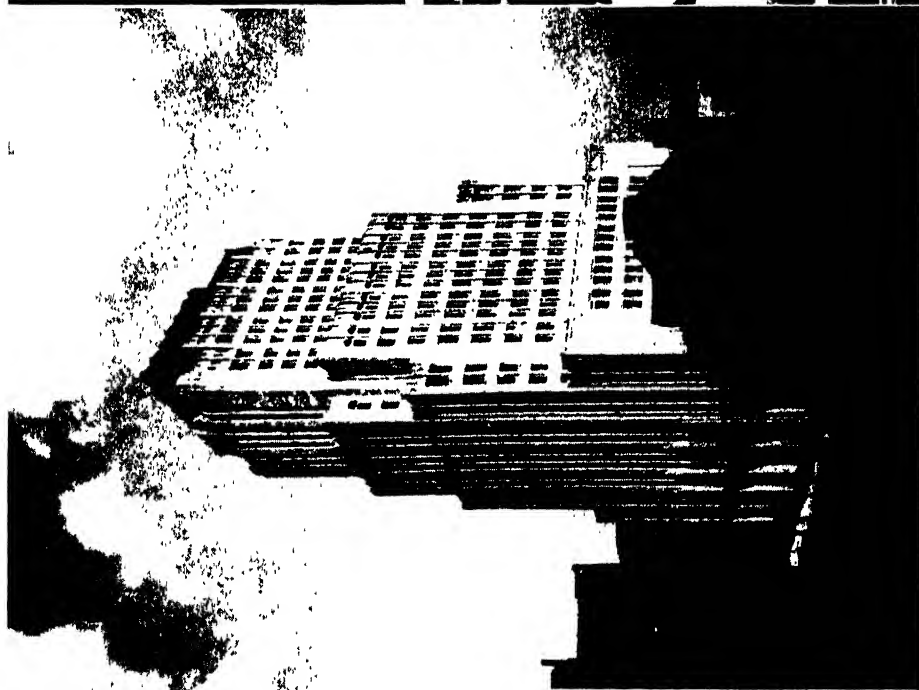
INTERIOR OF THE PUBLIC AUDITORIUM

This municipal building has seats for 12,500 people. It contains one of the world's largest pipe organs.

An interesting experiment in welfare work is the Warrensville Farm, occupying 2,000 acres eight miles from the city, and devoted to charitable and corrective purposes. Here are provisions for the treatment of tubercular patients, homes for the aged, and cottages where indigent old couples may spend their last years together. Here, also, is a workhouse with connecting shops and fields for employment. The project is municipally owned.

Commerce and Manufacture. With its spacious harbors, miles of dockage, and ample railway terminal space, Cleveland is equipped to handle an enormous volume of trade. Exclusive of ore shipments, the annual freight receipts exceed 25,000,000 tons, of which three-fifths are delivered by rail and two-fifths by water. The lake commerce consists mainly of coal, coke, and iron, with grain and livestock following. Every week, when navigation is open, a million tons of ore are brought into the harbor. Most of this cargo is used by the city's blast furnaces; the rest is reloaded onto freight cars, to be shipped to Pittsburgh and other steel centers. The city is also the largest market for fresh-water fish in America.

By rail and steamer, products of every sort and description go from Cleveland to all quarters of the world, and raw materials from every country are received. The city's export and import trade encircles the globe and has an average value of \$500,000,000 a year. The passenger business is also heavy during the summer, when luxurious steamers ply the Great



In the City of Cleveland. At the left is the massive building of the Ohio Bell Telephone Company; upper right, the Public Auditorium; below, the Museum of Art.
1477



Photo U & U

AIRPLANE VIEW OF THE PORT OF CLEVELAND

The shore line of the harbor, taken from an aeromarine flying boat. [Copyright: Hamilton Maxwell]

Lakes between Cleveland, Buffalo, Detroit, Chicago, and Duluth.

Cleveland has a water front of 14.2 miles on the lake and 18.0 miles on the river. Both harbors have been improved by dredging, and the

terminal and industrial lines, and six interurban roads. The railroads entering the city are the Baltimore & Ohio, the Cleveland, Cincinnati, Chicago & Saint Louis (Big Four), the New York Central, the Erie, the Pennsylvania, the Nickel Plate, and the Wheeling & Lake Erie.

In total value of manufactures, Cleveland is given fifth rank, among American cities, by the United States census. Its 2,400 factories produce goods to the value of a billion dollars a year, and the more than 14,000 different articles manufactured represent about eighty-three per cent of all those classified by the Federal census. Cleveland is preëminently a steel center, the value of its iron and steel products being one-third the value of all other commodities combined. These products include everything in hardware, from bolts to heavy machinery.

The city is second to Detroit in the manufacture of automobiles, and has the home factories of four pleasure cars—the Chandler, the Jordan, the Peerless, and the Stearns. In Cleveland are the largest paint and varnish interests in the world. Oil refining has been an important industry in Cleveland since 1862, when John D. Rockefeller built here his first petroleum refinery. The city is second to New York in the manufacture of women's outer garments, and has 175 mills making men's and women's wearing apparel. The lumber,



Photo. Visual Education Service

TOMB OF GARFIELD

government breakwater has been extended to nearly six miles. The rail service of the city is furnished by seven through railroads, five

sandstone, and limestone resources in the vicinity are the basis of prosperous building-material enterprises. In East Cleveland, at Nela Park, is located the chief lamp works of the General Electric Company, where millions of mazda lamps are made. The Glenn Martin airplane factory is another important Cleveland enterprise. Here are manufactured some of the planes used in the air-mail service, for which the city is the eastern division headquarters.

History. In 1796 Moses Cleaveland, head surveyor for the Connecticut Land Company, visited the wilderness known as the Western Reserve (which see), founded a settlement at the mouth of the Cuyahoga River and named it Cleaveland. In 1831 the spelling was changed by a printer to fit a headline space. The village of Cleaveland was incorporated in 1814, when it had a population of less than 100.

The Ohio Canal, connecting Lake Erie with the Ohio River, was completed in 1832; then the real development of the city began. In 1836, when the place had acquired a population of 6,000, a city charter was granted. In 1851 the first railroad came to Cleveland, providing connections with Columbus, and the next year the first cargo of iron ore from the Lake Superior region entered the harbor. In 1853 Ohio City became a part of Cleveland, making the first of several annexations through which the city acquired its present area.

Cleveland has been the home of many distinguished men, including James A. Garfield, a President of the United States; John Hay, Secretary of State during the McKinley administration; Tom L. Johnson, a local capitalist and politician of national reputation, the father of the three-cent street-car fare and mayor of Cleveland for several terms; Marcus A. Hanna, once United States Senator and a prominent national figure, and Newton D. Baker, Secretary of War in the Cabinet of President Woodrow Wilson. In Cleveland, John D. Rockefeller, oil king and philanthropist, laid the foundations of his fortune, and his magnificent estate is an interesting feature of the city. In 1921 Cleveland adopted the city-manager form of government, and to-day it is the largest city in the world functioning under that plan. In 1924 the Republican convention held its sessions in the Public Auditorium, nominating Calvin Coolidge for President of the United States.

E.M.

[An outline suitable for Cleveland will be found with the article CTRY.]

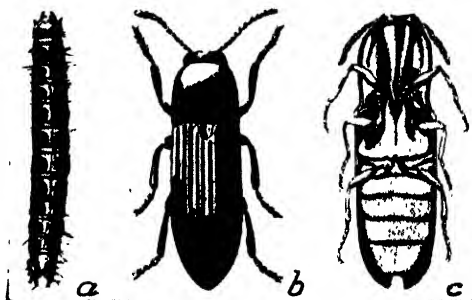
CLEVELAND HEIGHTS, OHIO. See OHIO (back of map).

CLICK BEETLE, SPRINGING BEETLE, OR SKIPJACK, names given to a family of springing, snapping beetles. If the click beetle is touched or alarmed, it falls to the ground, folds up its legs, and lies for a time as if dead. If upon its back, it will throw itself some little distance into the air by a sudden jerking motion accompanied by a clicking sound, and, landing on its feet, will run away. There are about 350 species of click beetles in the United States and Canada alone. Most of them are brownish; some are black, grayish, or marked with gay colors.

The young click beetles, long, slender, horny-skinned worms of brownish- or yellowish-white color, are called *wireworms* (see *a* in illustration). They hatch from eggs laid in sod, weeds, and grass. The wireworms are very destructive, boring into the seed of sprouting corn, wheat, and other grains. They also feed on the roots of field and garden plants. Several years are required for the wireworms to mature. In midsummer, or later, they pupate in the ground,



STATUE OF MOSES CLEVELAND
Founder of the city.



THE CLICK BEETLE

(a) Wireworm, the larva stage; (b) adult form, from above, (c) from below, showing snapping apparatus.

developing into adult beetles before winter. The beetles, however, do not emerge from the pupal cells until spring. The time to destroy these pests is when they are in the pupal state, in August and September, and the best method is plowing, disking, and harrowing of infested fields. They can also be checked by crop rotation, and by proper drainage in low, wet land.

Some of the tropical click beetles are luminous, and one species carries two glowing spots on each side of its thorax. In Cuba the dead bodies of these beetles are sometimes worn as ornaments. See page 1480 (Classification).

W.J.S.



Photo Wide World

MODERN CLIFF-DWELLINGS

If the reader will consult a map of France and locate a point about half way between Bondome and Tours, he may mark that location as the home of about two hundred peasants who make their homes in rock caves extending down the sides of the little hills bordering the River Lior (not to be confused with the larger Loire). The rent problems of these people do not weigh heavily upon them. At Montoire the purse-proud individual who inhabits the best cave in the hill pays \$5.00 a year rent, while lower and less desirable caves can be had for \$2.00 a year. The more affluent man justifies the larger rent outlay by the fact that his cave is kept warm and dry by the heat that arises from the hearth in the apartment below.

Classification. Click beetles comprise the family *Elateridae*, in the order *Coleoptera* (see **BEETLE**).

CLIFF DWELLERS. The history of this early American race can be gathered only from the ruins of their strange dwellings built in canyon cliffs and rocks. Nobody knows when they lived, or exactly what great page of human history they filled. They were gone long before the white man first saw America. From all the evidence that can be gathered, it is believed the Pueblo Indians descended from them; they may have been the Pueblos' immediate ancestors. The Moqui, or Hopi, and other Pueblo Indians to-day imitate some of the building characteristics of the Cliff Dwellers.

Reading the Cliff Dwellers' story from unearthed bodies, from bits of pottery, articles of wearing apparel and implements obtained from those almost inaccessible fortress homes, there is unfolded a tale of absorbing interest. In the corners of Utah, Arizona, New Mexico, and Colorado, which meet beyond the southern Rocky Mountains, lived this race of people, peace-loving but forced by warring neighboring tribes to live in the inaccessible cliffs, where their dwellings were strong as fortresses.

From excavations in one place in Arizona were recovered about 300 skeletons, some completely dressed, showing that the Cliff Dwellers were small in stature, black-haired, and had heads flattened perhaps by papoose boards. Side by side with the bodies were found weapons, utensils, and ornaments. The only metal objects discovered were small charms made of copper. The weapons were of polished stone; their many implements, of bone or flint. Hammers found were no doubt used to carry burdens, and there were brushes made of fibers. Clothing was probably scarce, and much of it, like the sandals, was made of milkweed fiber. Beads, feathers, and bits of buckskin were also found. The great variety of pottery unearthed was always tastefully decorated.

It has been decided that these were an agricultural people, who raised maize, beans, watermelons, tobacco, and cotton. They domesticated the turkey, and irrigated their fields with well constructed ditches.

Their Houses. The peculiar dwellings they built have given to the people their name. Most of them were on the tops of plateaus or high in cliffs, and could be reached only by winding, roundabout paths. Sometimes, too,



Photos Wide World; L. M. Lewis

Apartment Houses of Prehistoric America. Balcony House of ancient Cliff Dwellers, Mesa Verde National Park; Cliff Palace, a ruin of a communal village, in the same park.

steps were cut in the cliffs. Often these houses were built as high as 800 feet above the level of a river or valley floor. Constructed either of assorted stones held together with moistened clay, or of sun-dried bricks, these dwellings, like the homes of the Pueblo Indians, later, were usually built two or three stories high, each story set back from the one below, leaving flat, open roofs, or courts. The lower story had no windows, and entrance was obtained by means of ropes or ladders which led up on the outside to a hole in the roof. A ladder on the inside was then let down, and the outer ladder could be drawn up, thus guaranteeing safety from enemies. The rooms were generally very small, but there were many of them. Some rooms had fireplaces, and always there was one room half underground which the Spaniards called *estufa*, which, it is said, meant *council chamber*, where the principal men of the tribe assembled. In some of these *estufas*, crude pictures are found painted on the walls, in green, perhaps obtained from carbonate of copper, in black from charcoal, yellow from yellow ochre, and white, probably from kaolin.

One "cliff palace," in Cliff Canyon in Southwestern Colorado, is 425 feet long, contains 127 rooms, and is capable of affording shelter to 1,500 persons. The best-preserved cliff ruins are found in Colorado, and the Federal government is restoring some of these. c.w.

CLIFFS OF DOVER. SEE ENGLAND.

CLIMATE, the general average of temperature, moisture, and other weather conditions in any certain region or locality. The climate of a place, therefore, may be hot or cold, wet or dry, healthful or unhealthful, according to the kind of weather, or meteorological, conditions which have prevailed there for a great number of years. *Climate* may be said to be a settled or regular condition, for no very marked change has been known to occur in the climate of any region in 2,000 years. *Weather*, on the contrary, is a present atmospheric condition, and may change daily.

Influence of Climate on Civilization. Climate is the most potent factor in determining the civilization, vegetation, and animal life of a region. In the tropics, wherever the equatorial rain belt prevails, animal and vegetable life are abundant, but the excessive heat is apt to discourage the development of enterprise and energy in people. In the frigid zones, where there is little or no vegetation, the few people have difficulty in living, and cannot develop the arts and sciences. Thus it will be seen that in the great temperate zones, where cold and heat succeed each other, and where neither is extreme, are developed the great civilizations of the world.

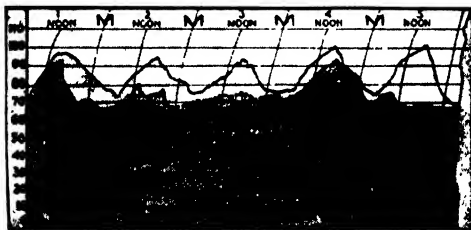
Factors of Climate. Climate is the result of a number of factors, or determining influences. These are chiefly latitude, altitude, distance

from the sea, winds, mountain ranges, rainfall, inclination of the earth's axis, and ocean currents. In general, the warmth necessary to sustain life comes from the sun; the sun warms the earth, and the earth in turn warms the air.

Latitude. The latitude of a place is the chief factor in determining its average warmth, or mean temperature, and the mean temperature of a place computed for not less than ten years is its "normal" temperature. At the equator, the rays of the noon sun are practically vertical, and in every part of the torrid zone they are vertical during a part of each year. Beyond the tropical circles, they fall more and more obliquely as the latitude increases; therefore, these parts of the earth receive less and less warmth as the latitude increases. If the earth were a perfectly smooth land mass, all places in the same latitude would have the same temperature; but this is not the case because there are so many modifying influences, altitude and distance from the sea being the most important.

Altitude. Altitude, or height above sea level, affects temperature. The air grows thinner and receives less heat from the earth in proportion to the distance one rises, the temperature falling one degree for about every 300 feet of elevation. Thus, even in the tropics, a wide range of temperature may be found in ascending a lofty mountain—one of the Andes or Himalaya mountains, for instance. At the foot, one experiences the temperature of the tropics; at 6,000 feet up, that of the temperate zone; at the summit, the eternal cold and snow of polar regions. The great plateaus of the tropics, which usually are at an altitude of 5,000 to 6,000 feet, have a cool climate.

Distance from the Sea. The position of a place or country with respect to the sea or to other large bodies of water also determines



CLIMATE AND TEMPERATURE CHART

The diagrams show the variations in temperature in Chicago, Ill., and Peoria, Ill., on the same days. The solid line represents Peoria; the broken line, Chicago. The latter city is on the shore of a great body of water; the former is over a hundred miles inland.

largely its climatic features. All places adjacent to the ocean or to the Great Lakes have a much more equable climate than those situated in the interior of a continent; the fact that the water is cooler than the air in summer and warmer in winter modifies the extremes of

temperature. Such places, therefore, are cooler in summer and warmer in winter than locations farther inland.

Winds. An examination of a wind chart (see WIND) shows that in equatorial regions the great air currents forming the trade winds have a northerly origin north of the equator and a southerly origin south of it. They tend, therefore, to modify the warmth of equatorial regions. In each temperate zone, the prevailing winds originate in warm regions and blow into the colder regions of higher latitudes. When the moisture mingled with the air falls as rain, an enormous amount of latent heat is set free, warming the air still more. Thus, the west coast regions of the continents which are in the temperate zones have much milder winters than those of corresponding latitudes on the east side of the continents. Because of warm southwesterly winds, the winters of Sitka, Alaska, are not colder than those of Philadelphia, nearly twenty degrees farther south. The climate of England is mild; that of Eastern Canada is hotter in summer and colder in winter.

The prevailing westerly winds also perform another important office. They blow the surface water of warm ocean currents into great drifts, and the warm water keeps the harbors and fiords in high latitudes free from ice during long winters. Because of the wind-blown drift of warm water, Hammerfest, a port within the Arctic Circle, is open all the year; on the other hand, the fiords of Labrador, considerably farther south, are ice-blocked more than half the year. Cold ocean currents have the opposite effect. The cold current coming down from Baffin Bay hugs the Labrador coast, carrying icebergs and cold fogs far into southerly regions. A cold current coming up from Antarctic waters flows around the lower part of South America and similarly affects its climate.

Mountains and Rainfall. Mountain ranges act as barriers, and by preventing the free passing of winds from one region to another, influence climate. The rainfall of localities is greatly affected by these mountain barriers. A wind passing over mountains leaves its moisture on the windward side and becomes a hot, dry wind on the opposite side. Thus, the Pacific coast has an excessive rainfall, while some of the regions east of the mountains are hot and arid, and are called the Great American Desert. The Sahara Desert in Northern Africa likewise is the result of mountain barriers, and the hot winds that blow from it and are intercepted by the Pyrenees and Alps make the climate of the Mediterranean region very much warmer than that in the same latitude elsewhere. Naples, Italy, has a semi-tropical climate, but it is almost in the same latitude as New York City.

Inclination of the Earth's Axis. The inclination of the earth's axis is one of the most

important factors in climate. In the torrid zone, it causes the movement of the equatorial rain belt north and south, giving nearly every part of the torrid zone an abundance of rain. In temperate zones, it causes the alternation of summer and winter, and in the frigid zones it causes the alternation of six months of sunshine with six months of darkness.

Rainfall. A region without rainfall is practically uninhabitable. The history of agricultural industries shows that a yearly rainfall not much less than twenty inches nor much more than forty inches is required for the world's wheat crop; that is, about 5,000 pounds of water are required for every pound of wheat. If the annual rainfall is less than twenty inches, food crops, with the possible exception of grass, usually must be helped by irrigation. If the annual rainfall is materially greater than fifty inches, it hinders rather than helps most food crops. The map of the distribution of rainfall compared with that of the density of population shows that most of the people of the world live in regions having an annual rainfall varying from twenty to forty inches, and also that such regions in the temperate zones will yield enough foodstuffs for nearly 100 persons per square mile.

Soil and Vegetation are also climatic factors. Sandy regions are always warmer than those with a clay soil; and where there are forests and abundant vegetation, the climate is more equable and the rainfall nearer normal for the location.

An *isothermal map* forms one of the most interesting studies in temperature. In following the lines which show the average temperatures of all parts of the earth's surface, it is interesting to note how little degrees of latitude sometimes have to do with the facts of climate.

R.H.W.

Related Subjects. The following articles in these volumes relate to the subject of climate, and will make more interesting certain phases of the general topic:

Acclimatization	Isothermal Lines
Air	Japan Current
Antarctic Circle	Labrador Current
Arctic Circle	Land and Sea Breezes
Blizzard	Latitude
Calms, Regions of	Meteorology
Chinook	Monsoon
Cloud	Norther
Cyclone	Ocean Currents
Desert	Prevailing Westerlies
Dew	Rain
Doldrums	Seasons
Dust, Atmospheric	Simoom
Equator	Sirocco
Equinox	Snow
Fog	Snow Line
Frost	Storms
Glacier	Tornado
Gulf Stream	Trade Winds
Hail	Tropics
Horse Latitudes	Typhoon
Humidity	Weather Bureau
Hurricane	Wind
Isobars	Zone

CLIMAX, in rhetoric, is the arrangement of words or clauses in the rising order of their importance, a most effective device when used by a skilful writer or speaker. Probably the best-known example of climax is Julius Caesar's terse announcement to the Roman Senate, "I came, I saw, I conquered." The beautiful passage from the ninth chapter of *Isaiah*, which is used with such stirring effect in Handel's oratorio *The Messiah*, is one of the numerous examples of climax found in the Bible: "And his name shall be called Wonderful, Counsellor, the mighty God, the everlasting Father, the Prince of Peace."

Climax is used with striking effect in oratory, an illustrious example being the following passage from Patrick Henry's eloquent speech against England before the Virginia delegates to the provincial convention which met at Richmond in 1775: "We have *petitioned*; we have *remonstrated*; we have *supplicated*; we have *prostrated* ourselves before the throne." Few stronger climaxes have been uttered in any age of the world's history.

Anti-Climax is the reverse of climax, the arrangement of ideas in the descending order of their importance. Ordinarily, the use of anti-climax serves to make a sentence weak, and should be avoided. The argument used by the country clergyman against swearing is a good example of anti-climax: "Oh, my brethren, avoid this practice, for it is a great sin, and, what is more, it is ungentleel." Very often writers deliberately resort to anti-climax in order to produce a humorous or sarcastic effect, as in the following lines from Pope:

Go, soar with Plato in the empyreal sphere,
To the first good, first perfect, first fair;
Go, teach Eternal Wisdom how to rule,
Then drop into thyself, and be a fool

CLINKER. See CEMENT.

CLINTON, DE WITT (1769-1828), an American statesman whose name is inseparably connected with the construction of the Erie Canal; to promotion work in behalf of the enterprise he devoted the best years of his life. He was born in Little Britain, N. Y., and completed his education with honors at Columbia College. He was admitted to the bar in 1788, but his earnest ambition soon carried him into politics, first to the assembly, then, in 1798, to the state senate, and in 1801 to the United States Senate.

In the year 1803, he was elected mayor of New York, an office which he held for twelve

years, except for two short intervals. During that period, he was again a member of the senate of New York, and was lieutenant governor of the state for two years. In 1812 he was defeated by Madison for President of the United States, but in 1817 was chosen governor of New York, and to this position he was reelected three times. During his third term, in the autumn of 1825, he was triumphantly carried on a barge from Buffalo to New York along the canal which his untiring effort had made a reality.

[The story of this effort is told under the title **ERIE CANAL**.]



Photo. Brown Bros.

DE WITT CLINTON

to the New York assembly; in 1775 he was sent as a delegate to the Continental Congress. In 1777 he was appointed a brigadier general in the Continental army, and during the war he turned his friendship for the Indians to the advantage of the colonists. He became first governor of the state of New York, serving in this position for eighteen years with exceptional ability and discretion. He opposed the adoption of the Federal Constitution on account of its centralization of power, and advocated the improvement of internal communication by navigation companies. In 1804 he was elected Vice-President of the United States, an office which he held until his death, serving with both Jefferson and Madison. In 1811 it was his vote which defeated the bill for the re-chartering of the Bank of the United States (which see).



Photo. Brown Bros.

GEORGE CLINTON

CLINTON, SIR HENRY (about 1738-1795), a British general who saw active service in the American Revolution, beginning at the Battle of Bunker Hill, with the rank of major general. After Washington's defeat in the Battle of Long Island in 1776, Clinton took possession of New York, and as a reward for his share in the American defeat was knighted and raised to the rank of lieutenant general. In 1778 he was placed in chief command of the British forces in America, with headquarters at Philadelphia. When he heard of Burgoyne's surrender and of the French alliance with the American cause, he evacuated Philadelphia and began a retreat through New Jersey. Washington hurried after him, and the two armies fought a battle at Monmouth in June, 1778, in which the British were defeated.

Clinton then stationed his forces at New York, where he remained until December, 1779. At that time he led an expedition into South Carolina, capturing Charleston in the following spring. After his return to New York, he planned to go to the aid of Cornwallis, but his expedition started southward on the day the latter surrendered. In 1782 the chief command was given to Sir Guy Carleton, and Clinton returned to England. Thereafter he served in Parliament and as governor of Gibraltar.

CLINTON, IA. See IOWA (back of map).

CLINTON, MASS. See MASSACHUSETTS (back of map).

CLINTON, MOUNT. See WHITE MOUNTAINS.

CLIO, kli' o. See MUSES.

CLISTHENES, klis' the neez, an Athenian statesman who introduced *ostracism*, or banishment by public vote, and who was one of the first to suffer this punishment. He was a member of the celebrated family of Alcmaeonidae and was noted for his democratic tendencies. Some of his plans for reform met with popular approval, but he was eventually forced to retire from Athens in disgrace. The dates of his birth and death are unknown, but many of his additions to the Athenian constitution are dated about 510 B.C. See OSTRACISM; ARISTIDES.

CLITUS, kli' tus. See ALEXANDER THE GREAT.

CLIVE, klive, ROBERT, BARON CLIVE OF PLASSEY (1725-1774), the military and administrative genius to whom Britain largely owes its empire in India. In his day, the government of English colonies east of the Cape of Good Hope was vested in the East India Company, to whom the eighteen-year-old Clive was sent as a clerk, because of his fondness for adventure and apparent inability to apply himself to school work.

Clive began his military career in 1747 as an ensign, after escaping from a French prison at Pondicherry. In 1751, in command of only 320 natives and British, and aided by inexperienced officers, he successfully defended Arcot against thousands of fanatical Mohammedans, and followed this exploit by several victories in the field. In 1757, at the Battle of Plassey, he established British supremacy in India by routing over 50,000 natives with his 3,200 men.

At his home-coming in the year 1760, Clive was given his title, and he entered Parliament. Five years later he was returned to the East

to revive the ebbing fortunes of the Company. He secured the formal allegiance of the Mogul emperor, reorganized the army, and reformed the civil administration. He reentered Parliament in 1767.

In 1773, after an investigation of the affairs of the East India Company, a vote of Parliament put on record that Clive had gained a fortune of £234,000 during his first administration, as charged by his enemies, but that he "did render great and meritorious service to his country." It is quite certain that none of the presents which Clive had received from Indian princes were bribes. But the shadow cast on him deeply stirred his morbid temperament, and he ended his own life the next year. See INDIA

(History: Coming of the Europeans).

CLOACA MAXIMA, klo a' kah max' si mah. See FORUM; ROME (How the City Looked).

CLOCK. The sun was man's first time-keeper, just as it was his first warmth and light.

The regular cycles of the sun, moon, and stars divided his time, and their positions in the sky marked off his waking hours. He knew that at the middle of the period of light the sun was directly overhead; and "noon," "dawn," and "sunset" meant the same periods, in whatever language they were spoken. Gradually, men found that the shadow of an isolated tree made a more accurate measure than the position of the sun in the sky; later, they found that they could replace the tree with a rod, placed wherever they wished, and could mark off the arc of its shadow into even divisions.

Thus was the first rude sundial made—the forerunner of those dials which "count only the hours that are serene" in our parks and gardens. And the remarkable fact is that in spite of our elaborate and convenient system of time-keeping to-day, the sun is still the measure of our day, and the simplest form of sundial can regulate our clocks within one or two minutes.

As life grew more complex, the necessity for a time measure on cloudy days or starless nights resulted in the first time machine, the *clepsydra*, or water clock. Scholars say it was known in China more than a thousand years before Christ, and the Egyptians, the Greeks, and the Romans used it. All of the many forms of the water clock had the same principle: fluid running or dripping from one receptacle to another was made to measure time by the rate of its flow. By some means unknown to us now, the varying length of days according



Photo Brown Bros.
SIR HENRY CLINTON

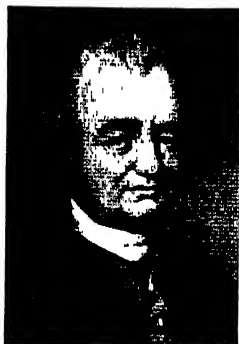
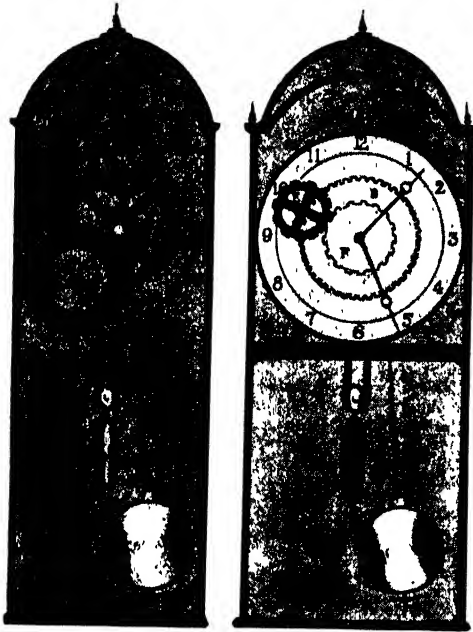


Photo Brown Bros.
ROBERT CLIVE

to seasons was allowed for in the ancient water clocks.

Many other time machines existed along with the water clock, and after it was dis-



THE MECHANISM OF A CLOCK
Explanation of the parts appears in the text.

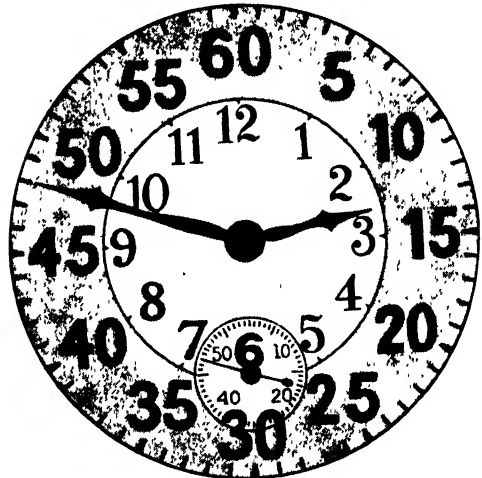
carded, the candles, marked with the rate of their burning, which were said to have been devised by Alfred the Great of England; the oil lamp; the knotted hemp (burning regularly from one knot to the next), which was used until recent years by Asiatic peasants; and that important variation of the water clock known as the hourglass or sand glass.

The modern clock, in its essentials, appeared for the first time in the fourteenth century, in the work of Henry De Vick. He built a clock which had wheels, dial, hour hand, weight, and winding square. Then from 1600 to 1700 some additions and changes were made—a pendulum, a minute and a second hand were added, and some parts replaced for the sake of greater accuracy. Since then the essential principles of the clock have not been changed; we have worked toward lightness and perfection of its time-keeping qualities, and have applied electricity to its operation, but otherwise De Vick's beginning and our modern clocks are much the same.

Essential Parts. The necessary parts of a clock are a set or train of wheels and a weight or spring to set and keep them in motion. There is also a face, or dial, and hands, or pointers, to indicate the time. The accompanying drawing illustrates the working principles.

Before a clock's mechanism can be set in motion, it must be "wound up." That means winding a chain round a barrel or drum, which is marked *A* in the picture. The weight at the end of the chain slowly falls, and as it does so it causes the drum *A* to revolve. The wheel marked *B* is then made to turn, as it is connected to *A* by cogs. The turning motion is passed on to the wheel *C* in the same way. To prevent the weight from falling too fast and making the wheels turn too quickly, there is a little device called the *escapement*, marked *D*, connected with a pendulum. This curved piece of metal has a tooth at each end, which fits into cogs in the wheel *C*. The pendulum as it swings to right and left moves *D* up and down and releases the wheel *C*, one cog for each swing, or tick. Instead of making the clock go, as is often supposed, the pendulum prevents the wheels from turning too rapidly. It also acts as a regulator; shortening the pendulum by means of a screw makes it swing more rapidly, while lengthening it makes it move more slowly.

The second illustration shows the face of a clock and the wheels which cause the hands to move. Wheel *F* makes a complete revolution once every hour and carries the long, or minute, hand with it. Wheel *E* is made to move by touching wheel *F*. At the back of wheel *E* is another smaller wheel with only six teeth; these fit into teeth in wheel *B*, which has seventy-two teeth, and carries the hour hand. Turning the small wheel of six teeth causes the large wheel



NEW FORM OF DIAL

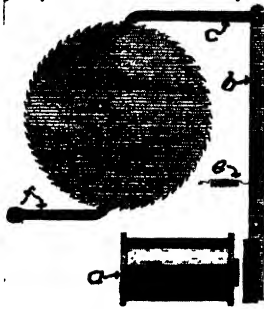
The inner circle of figures represents the hours; the outer circle, the minutes of the hour. This dial is especially valuable in railway stations.

B, with its seventy-two teeth, to turn just one-twelfth of the way around. Thus the combination of wheels causes *F* to turn twelve times while *B* turns but once.

Modern Spring Clocks. Though for centuries pendulums and weights were used, requiring perfect equilibrium and permitting only an upright position, it was eventually discovered that clocks could be made without them, and that a small steel spring would perform the same office. Instead of having a pendulum, spring clocks are fitted with a balance wheel, which prevents the other wheels from turning too rapidly. Small clocks and watches are made on the same principle, and both were impossible before the adoption of the spring; all that is necessary to start the mechanism is to wind, or tighten, the spring.

Clocks which require winding only at intervals of eight days or longer, and a special type which runs for 400 days without winding, are made possible by the principle of the steel spring and balance wheel.

Striking Clocks. The striking mechanism of a clock is separate from the ordinary time-keeping machinery. It is an interesting fact that many of the earliest clocks had no faces or hands to point out the time; the escapement principle mentioned above was used to strike a bell or gong. The word *clock* itself shows its close relationship to the German *Glocke* and the French *cloche*, both meaning *bell*. A weight or spring sets in motion wheels which release a hammer at certain times. The hammer falls on a bell or rod of metal and announces the hour. Many clocks have elaborate devices for striking chimes on a series of bells, for playing tunes, and for making certain figures go through regulated motions at regular intervals (see *Strassburg Clock*, page 1488).



ELECTRIC CLOCK MECHANISM
(a) Electromagnet; (b) rocking armature lever; (c) pawl; (d) ratchet wheel; (e) spring; (f) backstop

Cuckoo clocks, from which a small bird emerges and whistles the hours, are common in Europe and America. "Alarm" clocks, instead of striking the hours, have an attachment which causes a bell to ring at any indicated time.

Electric Clocks. The most important application of electrical knowledge to clock-making is the operation of a number of clocks in different places in unison with a master clock in an observatory, but there are also electric clocks which differ from the ordinary clock chiefly in deriving power from batteries, instead of from weights or springs. The picture shows one method of operating either type of clock. The cylinder *a* is an electromagnet in which the

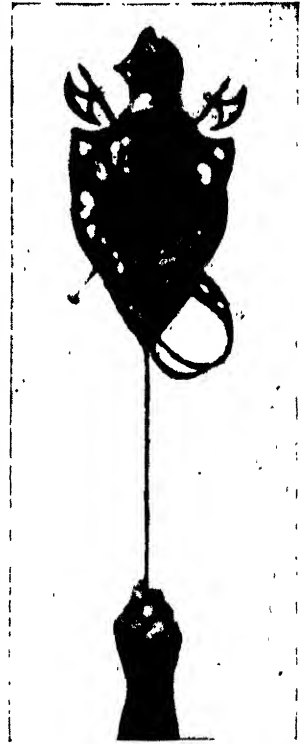
current is alternately excited and broken by the swinging of a pendulum, which in the case of a series of clocks is that of the master clock. When current passes through the coil, the lower end of the armature lever *b* is attracted and the pawl *c* pulled back as the lever swings on its pivot. The back stop *f* prevents the ratchet wheel *d* from slipping. When the current is broken, the spring *e* draws the lever back and the wheel receives a push.

Clock-Making Industry. So great is the demand for clocks that the United States alone, besides providing for nearly all its own needs, exports them in large quantities. Nearly 10,000,000 are manufactured yearly by American factories. American enterprise, to which is due the introduction of

the cheap but efficient steel spring, has revolutionized clock-making throughout the world. For more than 200 years previously, coiled springs had been used by European clock-makers, but only in the most expensive clocks. Now the spring clocks made in the United States are the cheapest, and, in proportion to their cost, the most satisfactory that can be obtained from manufacturers anywhere in the world.

Famous Clocks. Those which are well known for their size or other distinguishing features are described below:

The Largest Clock in the World is that built in 1908 for the Colgate Company of Jersey City. It was erected on top of the factory, and may be seen from the Hudson and from Manhattan. The dial is thirty-eight feet in diameter, and the two hands together weigh more than half a ton. Another huge clock is in the tower of the Metropolitan Life Building in New York City. Its dial is over twenty-six feet in diameter, and a set of chimes sounds the hours and the quarters.



Courtesy Mrs. James Noble

IT STILL RUNS

This old clock bears the date 1561 embossed in the metal frame. The solid hand is the pendulum.

Big Ben. Probably the world's most famous clock is that whose great bells have sounded the hours of day and night for more than seventy years from the tower of the House of Commons, at the north end of the Parliament Buildings, in London. Each of the

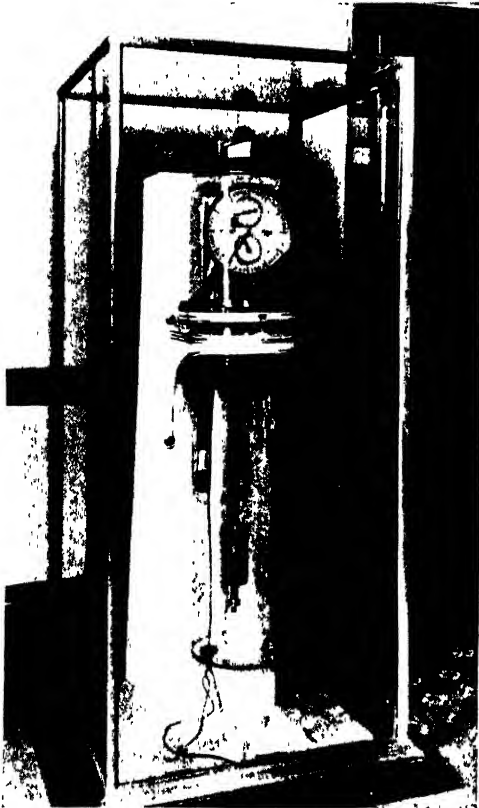


Photo P & A

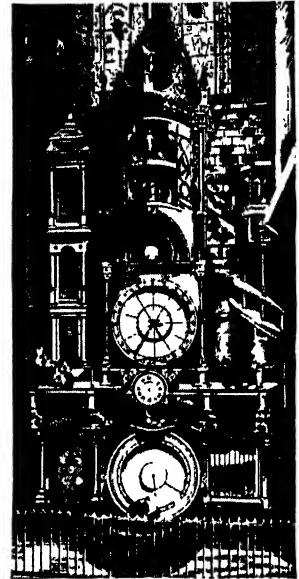
MASTER CLOCK OF THE GOVERNMENT

This clock is the time standard for the entire country. It is in an underground vault in Washington, and to safeguard it and others like it Congress passed a law forever prohibiting the building of any thoroughfare within 1,000 feet of the vault. This clock and others like it are in sealed glass cases from which the air is partially exhausted; the temperature is kept at 84° F. The clock shown above needs to be inspected only once every four years. [See subhead, *Naval Observatory Clocks*, in this article.]

four dials is twenty-three feet across, the minute hands are fourteen feet long, and the pendulum weighs nearly 450 pounds. The great bell which gives the clock its name weighs thirteen and one-half tons.

Naval Observatory Clocks. These clocks in Washington, D. C., are of wonderful accuracy and furnish the standard for the country. They are kept underground, so that they may be on the solid earth, and are operated within glass cylinders, in which the air pressure is very low. They are regulated by slight changes in this pressure, and have special seconds pendulums of a nickel steel which resists temperature. The clocks run with an error so slight as to be sometimes less than a second a month.

The Strassburg Clock, the most famous of the old clocks which have elaborate automatic figures telling more than the time of day, is in the cathedral of Strassburg. Besides telling the hour, this huge thirty-six foot clock tells the position of the heavenly bodies, has figures which point to the day of the month, a procession of gods and goddesses showing the day of the week, figures which strike the quarter hours, and one which turns an hourglass. Surmounting all is the figure of Christ, before whom, at noon each day, appears a procession of the Apostles, while a cock perched above crows three times. Similar famous clocks are found in Munich, Prague, and the French cities of Beauvais and Lyons. All of these clocks are evidences of the importance placed by the first clock-makers on complicated mechanism and automatic figures, as preferred to accuracy of time-keeping.



THE STRASSBURG CLOCK

Related Subjects. The reader is referred in these volumes to the following articles.

Hourglass Pendulum Sundial Watch

CLOG. See **BOOTS AND SHOES.**

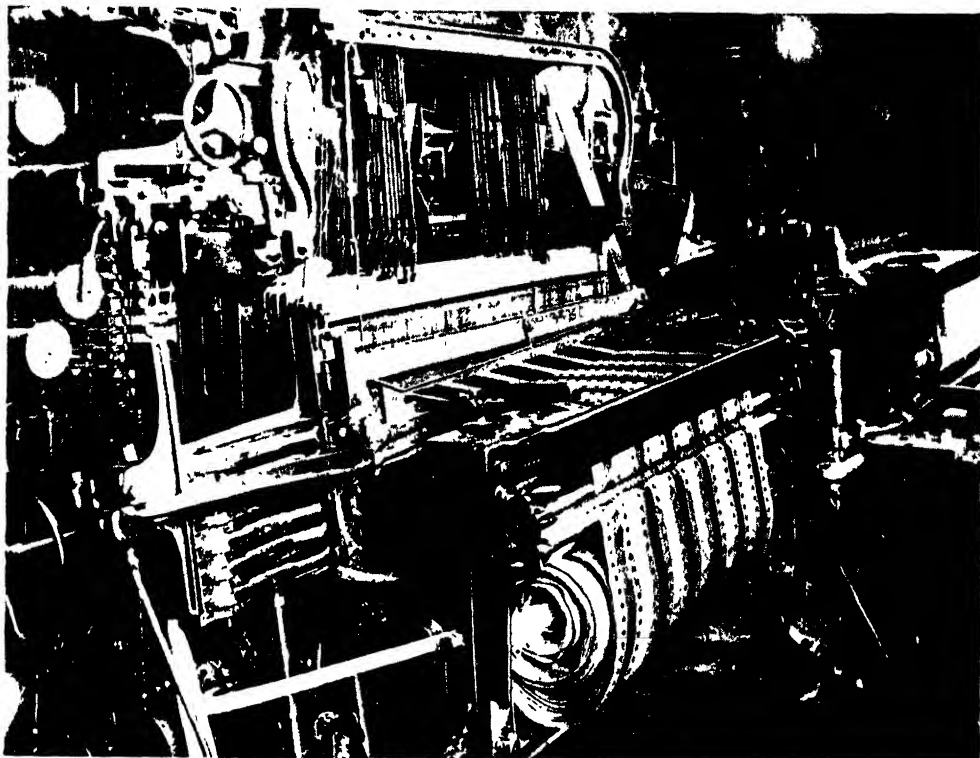
CLOISONNÉ, *kloi zo na'.* See **ENAMEL;** illustrations in article **POTTERY.**

CLOISTER, *klois' tur.* This word, which comes from the Latin *claudere*, meaning *to close*, was at first applied to the entire space enclosed



A CLOISTER

Seen in the foreground, with the garth beyond. within the walls of the monastery, cathedral, or collegiate establishment of the Middle Ages. Later, it designated the four-cornered court in



CLOTH AS IT COMES FROM THE LOOM

Photo: U & U

A close view of a loom, from which the finished cloth is emerging.

the center of the main group of buildings, which was surrounded on all sides by a covered, arched corridor. Sometimes the term was applied only to these corridors; the central, open space, which contained a well and garden, was known as the *garth*. Within the cloisters, the monks were accustomed to enjoy their recreation.

Milton's beautiful lines from *Il Penseroso* illustrate the general association of the word *cloister* with the serene and quiet life passed within the monastery:

But let my due feet never fail
To walk the studious cloisters pale,
And love the high embowered roof,
With antique pillars massy proof,
And storied windows richly dight;
Casting a dim, religious light.

CLOSED-CIRCUIT CELLS. See **ELECTRIC BATTERY**.

CLOSED SEASON. See **ANGLING; GAME**.

CLOSED SHOP, a term referring to a place or industry in which only members of labor unions are employed. See **OPEN SHOP; LABOR ORGANIZATIONS**.

CLOT. See **BLOOD** (Composition of the Blood).

CLOTBUR. See **COCKLEBUR**.

CLOTH, the woven material used for our garments and many of the furnishings in our homes. The first covering worn by man was made of foliage; then, for warmth, the skins of animals and feathers of birds were used. But animals became more scarce each year, and finally, the wool of sheep was used, twisted into threads and woven for use as garments. So the term *cloth* originally applied to woollen fabrics. Then, at various times, the value of cotton, flax, silk, and fibers of hemp, jute, and other plants was discovered, and the primitive methods of weaving were gradually improved, until now the making of cloths of all kinds is a world-wide industry.

Cloth is woven on a loom (see **WEAVING**). Two sets of threads are used, the *warp* threads running lengthwise of the goods, and the *weft*, or *woof*, threads running in and out across the warp. The edge of cloth woven to prevent raveling is called *selvage*. The warp is sometimes called the *back*, or *foundation*, of goods, and the woof, the *filling*. When the warp of a piece of goods is of cotton and the weft of silk, it is described as having a cotton back and a silk filling (see **WEAVING**). All-wool cloths have both warp and weft of wool, but most cloth



Photos: U & U

The Cloth Industry. In this spinning room of a Massachusetts cloth mill (first illustration), there are 93,000 spindles. Below, 4,000 looms in one room in the same mill.

sold as wool contains some cotton or other fiber. Worsted goods are made of well-twisted combed wool (see WORSTED).

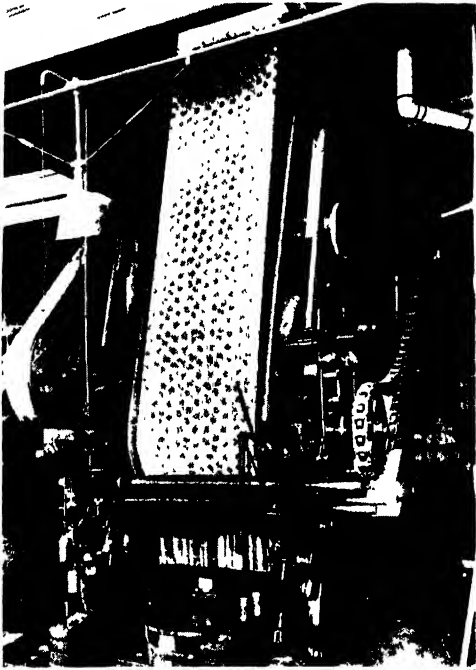


Photo: U & U

HOW CLOTH IS PRINTED

The design is etched on rollers, against which the cloth unrolls and makes contact for printing

The width of cloth depends on the number of warp threads. Its fineness or coarseness is determined by the size of the threads used and

their distance apart. According to the way in which weft threads are woven across the warp, cloths are *plain*, like muslin; *twilled*, like tweeds; *piled*, like velvet; *figured*, like damask; *mixed*, like cheviot; or *checked* or *striped*, like gingham.

Serge, cashmere, flannel, velour, and covert are some of the commonly known cloths of wool. Muslin, calico, gingham, some cambrics, canvas, duck, and dimity are widely used cotton cloths. Made of flax are the linens, including lawns, sheetings, toweling, and some cambrics. Pongee, crêpe de Chine, foulard, taffeta, satin, and surah are some of the best-known cloths of silk. So varied are the methods of manufacture that a single description will not apply to all cloths.

"Costly thy habit as thy purse can buy," is a wise phrase of Polonius in *Hamlet*, though often ascribed in error to Benjamin Franklin, in *Poor Richard's Almanac*. Fortunately, cloth is made to meet the demands of every purse.

Related Subjects. Each principal kind of cloth named above is described in its place in these volumes, and a study of these will identify the various fabrics with respect to utility and comparative values. Some details of manufacture are also included. See, also, ADULTERATION OF FOODSTUFFS AND CLOTHING

CLOTHES MOTH. See MOTH.

CLOTHIERS' TEASEL. See TEASEL.

CLOTHING. See DRESS (Related Subjects).

CLOTHING, ADULTERATION OF. See ADULTERATION OF FOODSTUFFS AND CLOTHING; LIFE EXTENSION.

CLOTHO, *klo' tho*, one of the three Fates (which see).

CLOTH OF GOLD. See CROCUS.

CLOTH OF GOLD, FIELD OF THE. See FIELD OF THE CLOTH OF GOLD.



The STORY of CLOUDS

CLOUD. Some clouds assume the shape of great, fleecy masses, some are feathery formations far in the upper air, and some are dull gray or black sheets which darken the earth and give promise of rain; but whatever their appearance, the formation is always the same. They are merely atmospheric moisture, condensed until it has become visible; in other words, they are upper-air fogs. That this is

true, the mountain-climber can bear witness. From below, he may see clouds high above as rolling masses, veiling the summit of the mountain; as he ascends, he loses sight of cloudlike forms but finds himself gradually enveloped in a heavy mist; and when at last he comes out upon the sun-bathed peak, he can turn and see the mist again as heaving billows of cloud below him.



When the sun warms the surface of the earth, water reached by its heat loses its liquid form and is transformed into vapor. This vapor rises, and as it cools by expansion in the light upper air, it is condensed again into the tiny particles of water or snow or ice which form the clouds. As their weight causes them to sink, these liquid particles come again to the warmer layers of air, and are once more vaporized and become invisible. So goes on the ceaseless change that we can nearly always observe in cloud shapes as they float past us, and that makes them, as Emerson has said, "always and never the same." Clouds or banks of fog are also formed when winds carry warm atmosphere into a cold region or cold air into warmer lands, for the result is exactly the same as when we "see our breath" on wintry mornings.

Every Cloud Has a Name. Because of the indication they give of weather conditions present and to come, clouds have been closely studied by men of science. To each shape of cloud has been given a name descriptive of it, and as the shapes depend upon the conditions within and around the cloud masses, the names ought to be known by all who like to "discern the face of the sky." Though they are Latin, most of them can be easily remembered by their resemblance to English words.

Cirrus, to a Roman, meant a ringlet of hair, and so the name was given to the curly white cloudlets of ice crystals which form high above all other clouds, five or ten miles above the earth's surface. The word *cirrus* may be recalled because it is similar to *circle*.

Stratus, which in Latin means *spread out*, is like the word *stratum*, the geological term for a *layer*. Stratus clouds are the most fog-like, and are generally very close to the earth. They are oftenest seen at morning and evening, when the still air contains no currents to break them up.

THREE FORMS OF CLOUDS
From top to bottom: cirrus, cumulus,
stratus

Cumulus means a *heap* (as we see in our word *accumulate*, which is to *pile up*), and cumulus clouds are the beautiful heaped-up masses of white that float across the sky on lovely summer days, casting swiftly moving shadows on the earth. It must have been a cumulus that inspired the conversation between Hamlet and old Polonius:

Do you see yonder cloud that's almost in shape of a camel?

By the mass, and 'tis like a camel indeed

Methinks it is like a weasel

It is backed like a weasel.

Or like a whale?

Very like a whale

Cumulus clouds travel at a height of perhaps a mile. In midafternoon, when the sun's rays are the warmest, the heaps increase in number and in size as more and more water is drawn up by evaporation, but when comes—

The evening beam that smiles the clouds away,

they lose their beautiful dream-like shapes in the flat monotony of stratus clouds. A great number of heavy cumulus clouds often portends rain, which comes when the atmosphere contains more moisture than it can support.

Nimbus is the very word which the Romans gave to a rain cloud. A nimbus is a rather shapeless formation, for its lower half contains the falling raindrops.

The cirrus, the stratus, the cumulus, and the nimbus are the four chief types of cloud forms, and from them most others take their names. Among frequently seen combinations are the following: *alto-cumulus*, white or grayish globular masses, sometimes closely packed together; *alto-stratus*, a thick cloud sheet of gray or bluish color; *cirro-stratus*, a thin, whitish sheet of clouds; and *cirro-cumulus*, masses of fleecy little cumulus clouds that produce the fair-weather aspect called "mackerel sky." Some of these combinations are shown in the accompanying illustrations.

THREE OTHER FORMS

From top to bottom cirro-cumulus, cirro-stratus, cumulus-stratus



The Poetry of Clouds. Like most works of Mother Nature, the cloud has always been a favorite symbol of other things, either, as in Browning, of temporary misfortunes, or, as in Shakespeare, of great heights. One poet alone has caught the spirit of the cloud as other poets have discerned the heart of the flower, the tree, or the brook. Here are parts of the first and last stanzas of Shelley's *The Cloud*:

I bring fresh showers for the thirsting flowers,
From the seas and the streams,
I bear light shade for the leaves when laid
In their noonday dreams.
From my wings are shaken the dews that waken
The sweet buds every one,
When rocked to rest on their mother's breast,
As she dances about the sun.
I am the daughter of earth and water,
And the nursling of the sky,
I pass through the pores of the ocean and shores,
I change, but I cannot die

Cloud-Burst. In desert and mountain regions a not unusual occurrence is a sudden heavy deluge of rain, lasting a short period of time and covering but a small area, falling with such terrific force that it seems as though a reservoir in the sky had broken and emptied its entire contents at once. In such a cloud-burst, it is impossible for the ground to absorb its usual proportion of moisture, and raging torrents are quickly formed in stream beds and even in usually dry valleys. Many of the most beauti-

The space covered by a cloud-burst is seldom more than a few acres, and the rainfall may be as much as five inches in fifteen minutes. These



Photo St. Clair

CLOVER BLOSSOMS AND LEAVES
Red, at left, white, at right.



Photo: St. Clair

SWEET CLOVER

ful of Nature's works, such as the fantastic promontories of the Grand Canyon in Arizona, have been carved by these torrential floods.

torrential rains are sometimes caused by the weakening of wind whirls holding a large quantity of water in suspension; sometimes they are the result of the impact of heavy showers against mountain masses. See LIGHTNING; RAIN.

R.H.W.

CLOVER, any one of several pod-bearing plants found along roadsides, on lawns, or cultivated in great fields for hay, pasture, cover crops, green manuring, for use as green fodder, or for soil improvement. Commonly, clover has leaves consisting of three rounded leaflets, but sometimes there are more. Who has not searched for the "four-leafed clover for luck," or having found a five- or six-leafed clover, has not thought of the old superstition, that evil would follow? Most children have discovered what the bees have always known—that the purple, red, pink, white, and yellow dense heads or spikes of blossoms hold stores of nectar. Because bees get so much sweetness from clover, the term, "to live in clover," means the height of luxury and plenty.

Kinds. There are about 300 species of clover, some of which are merely weeds, but many are of immense value for the uses mentioned above. The common *red clover*, native of America and most parts of Europe and now cultivated in other countries, is the most important. It grows in temperate climates from six inches to two feet high and blooms from April to November, and as it lives for two years, it is classed

as a biennial (which see). It is used for hay, for pasture, and for enriching soil. It is excellent food for milch cows, sheep, and young stock. And its roots gather so much nitrogen, which they leave in the soil, that it is an excellent crop to restore fertility to worn-out land. Bumblebees are absolutely necessary for the fertilization of the clover, however, and the experience of the Australians with this valuable plant is interesting. They imported large quantities of clover to plant for fodder, but left the bumblebee behind, so the next year there was no clover seed for planting, and no crop could be raised until bumblebees were introduced.

White clover is also very valuable for pasture, and its fragrant blossoms furnish nectar for the highest-priced honey on the market. White clover is seldom grown alone, however, as it does not yield as much as red clover. It is usually mixed with grasses and other clovers.

Alsike, or *Swedish clover* was introduced into the United States and Canada from Sweden by way of England. Its flowers, ranging from white to pink, are borne in rounded heads. *Alsike clover* grows well in a cool, moist climate, and at harvest time withstands wetting better than red or white clover.

Other species include *crimson clover*, a plant with bushy habit of growth, which is much used for soil improvement; the yellow-flowered *hop clovers*; and the silky-flowered gray-pink *rabbit-foot clover*, which grows on worn-out soils. Red, white, *alsike*, and *crimson* are the four species important in the agriculture of the United States and Canada.

Distribution in America. Red clover is the most common of the leguminous hay plants grown between the Atlantic coast and Eastern Kansas, and between Tennessee and the northern limit of agriculture in Canada. It is also important in some sections of Idaho, Oregon,

Washington, and in some of the Western provinces of Canada. White clover is distributed generally over the United States and Canada, except in regions of little rainfall. *Alsike clover* is also of wide distribution in these countries, but the United States imports a considerable amount of *alsike* seed from Canada. *Crimson clover* is found chiefly in regions with mild winters.

The value of clover as a soil-improving crop is being realized more and more each year, but in many sections it no longer grows as easily as at one time. In some places, certain necessary elements in the soil have been exhausted; in others, diseases have caused failures of the crop. Covering with straw and burning to prevent spread is the best cure for clover-rust, clover rot, leaf spot, and dodder, and plowing under is advised if one would be rid of the worst clover insect pests. Before planting, to obtain a good, clean crop, the seed should be carefully examined and sifted through wire-cloth screen to remove weed seeds, especially dodder.

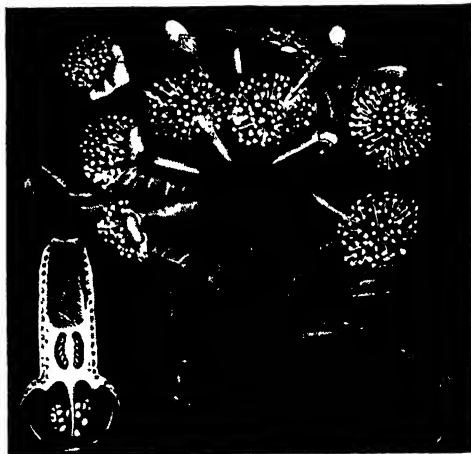
B.M.D.

Classification. The clovers belong to the genus *Trifolium* in the family *Leguminosae*. Red clover is *T. pratense*, white clover is *T. repens*; *alsike*, *T. hybridum*, and *crimson*, *T. incarnatum*.

CLOVES, a spice, the dried, unopened flower buds of a tree which is a native of the Molucca, or Spice, Islands. It is now cultivated in Su-



ROOTS OF SWIFT CLOVER
Nodules of nitrogen-fixing bacteria are shown



CLOVES

Flower, leaves, and cross-section of bud.

matra, Jamaica, the West Indies, and Brazil. The tree is a handsome evergreen, from fifteen to thirty feet high, with large, oval, smooth leaves, and numerous purplish flowers on jointed stalks. The buds, gathered when reddish, are picked by hand. They are then dried, and in the drying process turn dark brown. They have a very fragrant odor and a bitterish, sharp, warm taste. This spice is used chiefly

in cooking, but the buds and stem yield an oil much prized for flavoring desserts and candy and for scenting soaps. Oil of cloves is also used medicinally; in cases of toothache, it will deaden the pain, but it lacks curative properties. The name *clove* comes from the French word *clou*, meaning *nail*, and was suggested by the shape of the bud. B.M.D.

Scientific Name. The clove plant belongs to the family *Myrtaceae*. Its botanical name is *Caryophyllus aromaticus*.

CLOVIS, *klo' vis* (466-511), a noted warrior and king of the Franks. He was the son of Childeric I, and in 481, at the age of fifteen, succeeded his father on the throne. Clovis was very ambitious, and this trait led him into war. When a mere youth, he attacked with his army the Roman general Syagrius and completely vanquished him at Soissons, which he afterward made his home. He is said also to have conquered the whole of Belgica (modern Belgium), of which Rheims was the capital.

His wife was a Christian princess of Burgundy. She greatly desired the conversion of the king, but he remained a pagan until the close of his successful war with the Alemanni, when, in fulfilment of a vow, he was baptized at Rheims. This was an important event to the orthodox Christians of Western Europe, who afterward looked to him to support them against the Arians. After the conquest of the Visigoths, the kingdom of Clovis extended to the Pyrenees. He later became king of all the Frankish tribes, and was the founder of the Frankish monarchy. See **FRANKS**.

CLUB, a body of either men or women, or frequently of both sexes without discrimination, organized to promote some particular object, whether literary, political, or merely social. The derivation of the word indicates something of the nature of such an organization, for club comes from an old word meaning *to divide*, and has reference to the fact that the expenses of a club are divided among the members.

Historical Clubs. The first club that really made a place for itself in history was that to which Shakespeare, Raleigh, Beaumont, and Fletcher belonged. It met at the Mermaid Tavern, in Bread Street, London, and from it went forth judgments and criticisms that strongly influenced the literary life of London. Later came the Kit-Cat Club, named for Christopher Cat, whose mutton pies graced its banquets; the Beefsteak Club, with its motto of "Beef and Liberty" and its custom of calling its members "Steaks"; and that famous organization known to its members simply as "The Club," but commonly referred to as the Literary Club. Of this group, Dr. Samuel Johnson was the recognized head, though the membership included such brilliant men as

Goldsmith, Garrick, Reynolds, Burke, and Gibbon. This club still exists in London, though it no longer sways public opinion as it did in its early days.

The earliest clubs were largely social in their nature, but men of like political convictions tended to seek the society of one another, and thus political clubs grew up. In the eighteenth century, many a man was successful or defeated in public life according as he gained the good will or ill will of one of these organizations.

Modern Clubs. Practically all of these clubs, whether literary, social, or political, had their beginnings in some tavern or coffee house, where all future meetings were held, the landlord often finding it worth his while to neglect other patrons for the sake of some such club organized within his doors. Still there was no hint of the club in its more modern sense—the club in which the members actually own the clubhouse and its equipment. This was a product of the early nineteenth century, and had its beginning in associations of army and navy officers who, reduced to half pay on the cessation of the Napoleonic wars, found it cheaper to combine their resources and live under one roof.

From that time on, clubs have spread rapidly, and every great city has its organizations which play a more or less definite part in its life. London, for instance, the original home of the club, has no fewer than 100 societies of note—literary, scientific, artistic, political, athletic, and social; and all of these phases of club life are represented in the large cities of the world. Some of the buildings possessed by these organizations are very large and sumptuously appointed, and life in them is luxurious in the extreme.

These are clubs in the most formal sense, but along with these have grown up thousands of organizations less ambitious in purpose and less wide in their scope. There are clubs for women, for children, and for men who cannot afford to avail themselves of the privileges of the great city clubs. Some of these less formal organizations are small, but others have hundreds of members.

Related Subjects. A number of organizations which may be classed as clubs are treated in these volumes under the following subjects:

Boys' and Girls' Clubs	Kiwanis Clubs
Canning Clubs	Leons Clubs
Civitan Clubs	Rotary Clubs
Fraternalities, College	Women's Clubs

See, also, **FRATERNAL SOCIETIES**

CLUNY, *kloo' ne*, in modern times, a handsome, though coarse and thick, strong, white lace made by hand in Belgium, Germany, and Italy. The real cluny is expensive, the price varying with the width and pattern, but machine-made imitations are numerous. Modern cluny lace is used largely for edging doilies, scarfs, and tablecloths. There are three ways

to detect imitation from real cluny. If two sizes of thread are used, and if they are crinkly, irregular, and loose, the lace is imitation, in contrast with the real, in which only one size of thread, straight and taut, is employed. Imitation cluny is usually made of cotton; the real is made of linen.

Ancient cluny was a French net lace in which the pattern was darned. This is now known as *antique, fillet, or spider work*.

Derivation. The name *cluny* was taken from the museum of Cluny, where samples of ancient lace are kept. This is in the town of Cluny, or Clugny, in Eastern France. At one time the most celebrated Benedictine abbey in France was located there, and the abbey church, destroyed in the time of Napoleon, was then regarded as one of the world's wonders.

CLUNY ORDER. See MONASTICISM.

CLYDE, klide, RIVER, commercially the most important stream in Scotland, celebrated throughout the world for the shipbuilding yards which line its banks. "Built on the Clyde" was formerly as high praise for a vessel as is now the familiar "At Lloyds," referring to the great London shipping insurance company. The river is formed by a combination of small mountain streams draining the counties of Lanark, Renfrew, and Dumbarton, and flows

through some of the most romantic scenery in Scotland. The celebrated Falls of Clyde, in addition to being noted for their picturesque beauty, furnish power for many mills. The most important point on the banks of the Clyde is Glasgow, and below this city the river gradually expands into the great estuary known as the Firth of Clyde. The actual river is only seventy-five miles long; the broad estuary is ninety miles in length. In 1812 the first European steamboat was launched on the Clyde.

CLYDESDALE. See HORSE.

CLYTEMNESTRA, kli tem nes' trah, in Greek mythology, the unfaithful and treacherous wife of Agamemnon and half-sister of Helen, Castor, and Pollux. The poet Homer tells how, during the absence of her husband in the war against Troy, she bestowed her favors on Aegisthus. On Agamemnon's return they murdered him to hide their guilt, and together governed Mycenae for years. Her son Orestes later avenged his father's death by killing both Clytemnestra and her lover.

Related Subjects. The reader is referred in these volumes to the following articles

Agamemnon Helen of Troy Orestes Troy

COAGULATION, ko ag u la' shun. See BLOOD (Composition of the Blood).



COAL. If we burn wood in a closed vessel, so that only a little air can get to it, we obtain a black substance which is nearly all carbon. We call this substance *charcoal*. What we may do on a small scale in making charcoal, Nature in the past ages did on a large scale in making the coal which we now take from the mines.

Possibly you have stood beside a marsh and noticed that in spots it was filled with a kind of moss, that seemed to be dead underneath and alive on top. Cutting down into this moss usually shows it to have a thickness of several feet, and to be more compact near the bottom than at the top. In Ireland and other regions, some parts of America included, this moss occurs in large quantities, and in Europe it is dried and used for fuel under the name of *peat*. Now, if this peat had been buried deeply in the earth and subjected to intense heat, it would have been turned to coal, something like the charcoal. We may say, then, that peat is coal in the process of formation.

Ages before man lived upon the earth, portions of it were covered with a dense growth of vegetation far more luxuriant than that found now in the densest tropical jungles. This vegetation consisted of great tree ferns, and fernlike plants that bore seeds, horsetail rushes forty feet high, and club mosses even taller. By the lowering of the level of the land, these vast forests were covered by the ocean, and while resting for ages on the bottom of the sea, they were buried in mud. The land again rose and appeared above the ocean. The mud was hardened into rock, and the buried vegetation by heat and pressure was turned into coal. This process was repeated many times through uncounted ages, and for this reason we find the coal in veins, one above another and separated from each other by layers of rock. Green plants grow only under direct sunlight. Since the plants of the Coal Period (Carboniferous System) owed their growth to the influence of the sun, coal is sometimes called *buried sunshine*, a very appropriate name. The coal beds are



APPROXIMATE COAL AREAS OF THE UNITED STATES AND CANADA

believed to have been formed at least 20,000,000 years ago.

Mineral coal, as hard and soft coal are generally called, differs from charcoal in several particulars. Since it was formed under great pressure, it is more compact, and since the air was practically excluded during its formation, many of the gases that are driven off in making charcoal were changed into substances that combined with the coal. These are compounds of hydrogen and carbon with a few other substances, and their presence in varying proportions gives us the different varieties of coal.

Proof of the Origin of Coal. Bituminous coal is dirty and black, and anthracite, also black, is none too clean; but scientists tell us that they have found very great beauty in both varieties, in their efforts to learn exactly of what coal is composed and how it was formed. They have cut from lumps of coal slices thin

enough to be translucent, and have placed them under microscopes which magnify more than 1,800 diameters. The preparation of such a thin section is a most difficult task. First, a thin piece is sawed from a lump; then it is ground down smoothly until it is reduced nearly to a film—that is, until it averages about one five-thousandth of an inch in thickness.

Seen through a powerful microscope, such a slice of coal is translucent. The color is no longer as dark as night, or sooty, or forbidding. In the cross section from the dirty, black lump one beholds a landscape in brown and gold. Golden links in serried chains bound in filigree fill portions of the view. The links are cross sections of the cells of pieces of wood—of twig, branch, or log that entered into the product we call coal. Each cell in the wood is a jewel box of gold. In the hollow interior, where once

were protoplasm, starch, and other substances embracing the very life of the plant, there is seen a transparent, amber-like substance, clouded with sepia and containing clusters of shining crystals of utmost minuteness, together, perhaps, with tiny, glistening globules of gas.

Stem of leaf and fern, scale of catkin or cone, are seen in tissues traced in saffron and orange, straw-color and russet. Scattered here and there are spores of club moss, fern, or fungus, and pollen of many kinds of flowers; and there are resins of different kinds—brownish, amber, yellow, or red.

Geological as well as microscopic study of coal proves that all of its ordinary varieties

began their existence, in ancient geological times, as peat deposited in vast swamps that spread back of the low coasts or in the interior lowland basins of the continents. The great chemical and physical transformations by which the peats were changed to lignites and the different ranks of bituminous and anthracite coal have been brought about by geological processes. The principal agents in this geological laboratory were pressure, heat, and time, each contributing to the production of an important factor in civilization.

[The reader will find a vivid description of the chief coal-making era in the article CARBONIFEROUS PERIOD.]

Varieties and Distribution

Varieties. Three general varieties of coal are recognized in commerce. The classification is founded on the degree of hardness, and the varieties are *anthracite*, *bituminous*, and *lignite*. Each variety may be subdivided into several sub-varieties, each named for some distinguishing quality or from the locality where it is mined, as *Indiana Black*, *Lchigh Valley*, and *Pocahontas*.

Anthracite. Anthracite is the hardest, cleanest, and best variety. It was once popularly called *stone coal*, because it is so hard and is supposed to have been the first coal formed, since it occurs deep in the earth. It was subjected to greater heat than bituminous coal, since it is almost pure carbon; if the carbon content is at least ninety per cent, the coal is anthracite. The most extensive anthracite mines are in Eastern Pennsylvania; nearly all of America's anthracite is there, in an area less than 500 square miles. The veins do not lie as they were formed, for they have been moved by mighty convulsions of the earth; some are near the surface, while others are found at great depths. Anthracite burns with little or no flame and without smoke, and produces intense heat. Its chief uses are for warming dwellings and for the manufacture of water gas.

Bituminous Coal. Bituminous coal is much softer than anthracite, and contains much more matter that is readily vaporized; it is sixty to seventy per cent carbon. Tremendous pressure and heat over long ages would squeeze and cook out of coal the tarry material that makes it soft. Hence, soft coal is hard coal in its earlier stages. Bituminous coal burns with more or less flame and a dense black smoke, the latter caused by the escape of unburned carbon into the air. In many large cities, this smoke has become so annoying that ordinances have been passed requiring the use in chimneys of such devices as will prevent the nuisance.

Bituminous coal is widely distributed in the United States and Canada, and in nearly all

other countries. The great coal fields of Western Pennsylvania, Ohio, West Virginia, Indiana, and Illinois all contain it. Canada's largest coal areas are in Alberta; its next largest fields are in Saskatchewan and in the Maritime Provinces. Bituminous coal from different fields varies in composition. That from one region, as Illinois, is especially suited to one purpose, the production of steam; that from West Virginia is especially valuable for coke, and so on. Hence, we find the names *steam coal*, *gas coal*, and *coke coal* applied to these coals of different composition. Some of the best grades of bituminous coal approach anthracite in hardness. These are known as *semi-bituminous*, and have a carbon content of eighty to eighty-five per cent.

Cannel Coal. This is a variety of bituminous coal which is very compact. It burns like a candle from one end of the lump to the other, hence its name, *cannel* being corrupted from *candle*. Very hard pieces take a good polish, and they are sometimes used for ornaments. Cannel coal is highly prized for burning in open grates, but it is very scarce.

Lignite. Lignite is of a brown color, soft and brittle. It is the most recently formed coal, and contains more or less earthy matter. It often shows a woody structure, and sometimes branches or twigs are found in it in the form in which they grew. Lignite occurs west of the Mississippi River, where it is mined in North Dakota, Montana, Utah, Wyoming, Colorado, and New Mexico. The scarcity of other fuel in these localities makes it of considerable value for warming dwellings. It is not, however, well suited for use in steam boilers, because of impurities present which prevent it from producing so intense a heat as anthracite or bituminous coal.

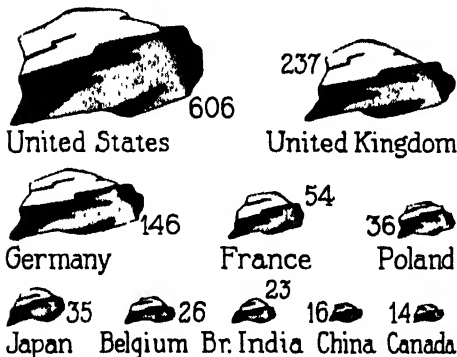
Distribution. Coal is found in all the continents, but the largest areas are in North America and Asia. The fields in Asia, however, are only slightly developed, and the United States, Great Britain, and Germany produce as yet over eighty per cent of all the coal

used in the world. The following table gives the estimated area of the coal fields of the world, so far as they have been located, and the chart below shows the annual production:

COUNTRY	AREA IN SQ. MI.
United States	333,000
Canada	70,000
China	200,000
Japan	No data
India	35,000
Russia	27,000
United Kingdom	12,000
Germany	3,600
France	1,800
Austria and Hungary	No data
Australia	Undetermined

United States. The United States produces more coal than any other country. The great coal fields are the Appalachian, the Eastern interior, and the Rocky Mountain. The Appalachian field covers an area of over 70,000 square miles, and extends from the northern boundary of Pennsylvania in a southwesterly direction to the north-central part of Alabama.

Millions of Short Tons



WORLD PRODUCTION

The figures represent an average annual yield for four years.

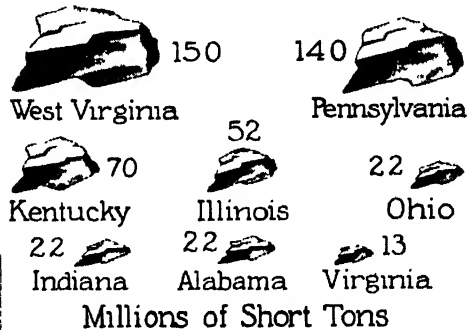
The anthracite coal measures are in the eastern part of this field, near its northern extremity. Pennsylvania, West Virginia, and portions of Virginia, Ohio, Tennessee, Kentucky, and Alabama are included in this field.

The eastern interior field includes parts of Tennessee and Kentucky, Indiana, Illinois, and all the other states in which coal is found east of the foothills of the Rocky Mountains. Its area is about 94,000 square miles.

The Rocky Mountain field includes the region extending from the eastern foothills of the Rocky Mountains to the Pacific coast. Its area is about 45,000 square miles. Most of the coal in this field is lignite, though valuable seams of bituminous coal are found in Colorado.

The total area of the coal fields within the United States, not including those of Alaska, is about 333,000 square miles. This is equal

Bituminous Chart



Millions of Short Tons

PRODUCTION BY STATES

The figures represent average annual production for five years.

to the combined areas of Texas and Oklahoma, or the state of New York and five states as large as Illinois, or eight times the area of Ohio.

The present annual output of the United States is about 600,000,000 short tons (2,000 pounds). The leading states in the order of production in average years are—

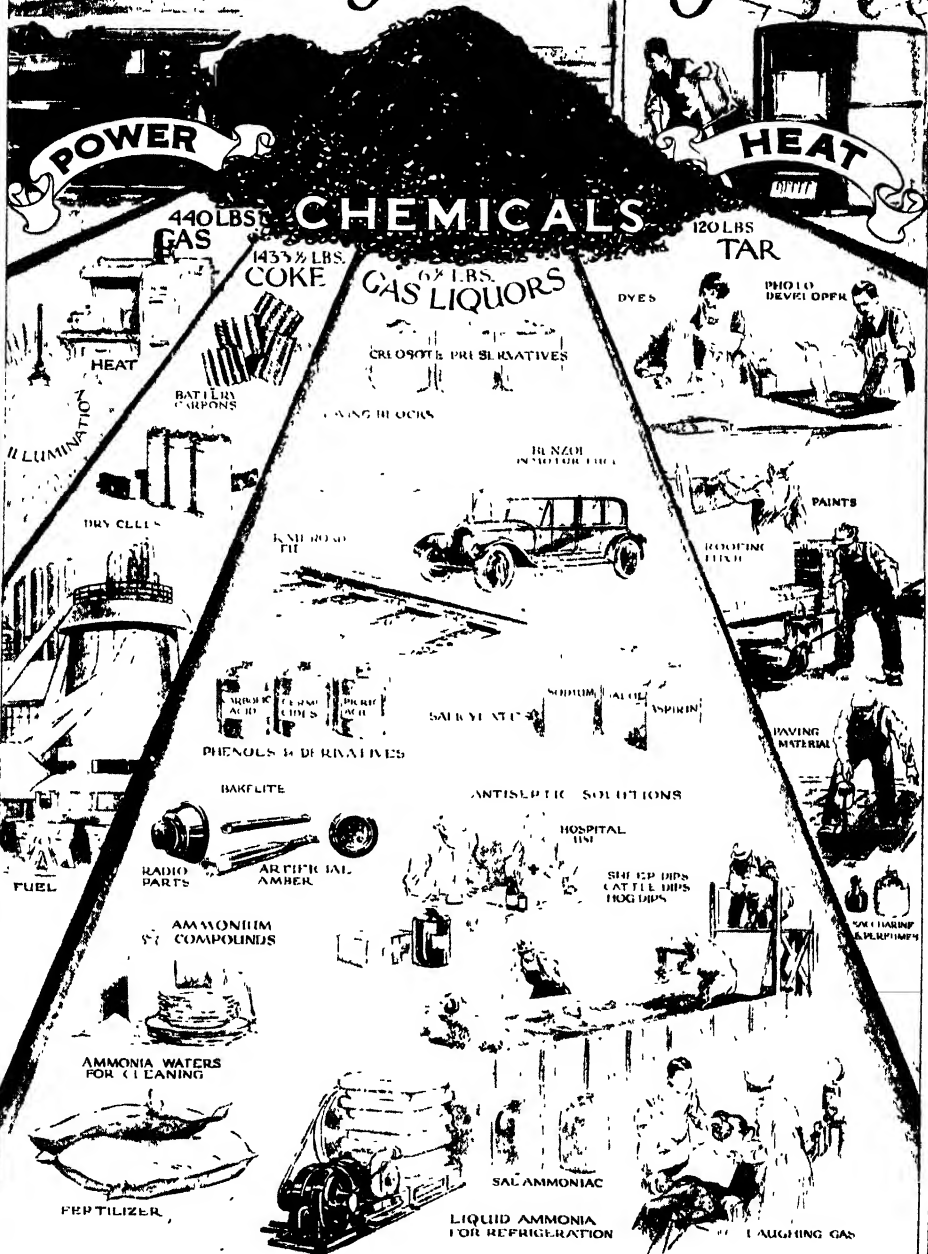
West Virginia	Indiana
Pennsylvania	Alabama
Illinois	Virginia
Kentucky	Colorado
Ohio	Wyoming

Canada. The coal fields of Canada occur in New Brunswick and Nova Scotia and in Saskatchewan, Alberta, and British Columbia. The Nova Scotia fields are of great value and have been worked for many years. The fields in Saskatchewan and Alberta are the largest in area and contain lignite and bituminous coal, some of the latter being an excellent cooking coal. The exact area of coal-producing lands in the whole Dominion has not yet been determined.

Other Countries. Great Britain, next to the United States, is the largest producer, followed by Germany. The table shows that most of the leading countries of Europe produce some coal. In Asia production is practically confined to Japan, China, and India; in Africa, to Cape Colony; and in South America, to Chile. Australia and New Zealand produce as yet only a little more than is needed for home consumption.

Quantity of Coal. Each field contains a number of veins of coal. In the older mines of Pennsylvania and West Virginia, a number of these veins have been worked so long that some shafts are 1,500 or more feet deep, and

What We Get from a Ton of Coal



And there are Many Hundreds More not illustrated here

PRODUCTS AND BY-PRODUCTS OF COAL

Coal not only heats our homes and public buildings, provides power for railroads and steamships, and keeps alive the great furnaces that transform iron into steel, but it enters into everyday living at innumerable points of contact. For coke, gas, ammonia, and tar are all derived from coal, and they, in turn, have derivatives that are now considered indispensable to modern civilization. The most important of the products obtained from coal are listed below:

GAS

Benzol
Carbon bisulphide
Cyanogen
Fuel gas
Illuminating gas
Sulphur
Toluol
Xylol

GAS LIQUOR

Ammonium carbonate
Ammonium chloride
Ammonium nitrate
Ammonium sulphate
Anhydrous ammonia
Aqua ammonia

COKE

Domestic coke
Metallurgical coke
Oven carbon
Electrodes
Lampblack

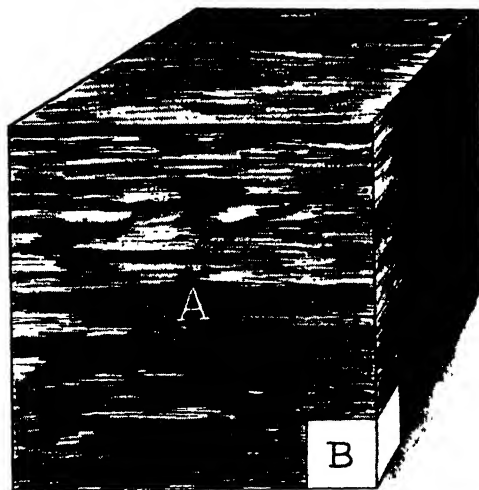
TAR

Acetanilid
Alizarin
Aniline
Anthracene
Antipyrin
Aspirin
Bakelite
Benzene
Benzoic acid

Carbon bisulphide

Cresols
Coumarin
Disinfectants
Dyestuffs
Explosives
Flavorings
Indigo
Insulation
Lampblack
Lubricating greases
Naphtha
Naphthalene
Nitrobenzols
Paint
Paving material
Perfumes
Phenacetin
Phenol
Photo developer
Picric acid
Pipe coating
Pitch
Resorcin
Roofing
Saccharine
Salicylic acid
Synthetic resins
Tarred felt
T N T
Toluene
Toluol
Waterproofing
Wood preservative
Xylol

below these veins there are probably others that have not been discovered. It is therefore impossible to estimate accurately the



COAL SUPPLY OF THE UNITED STATES

A cube (A in the illustration) ten miles on each edge represents the total coal resources of the American republic. The small cube B fairly, though not with absolute accuracy, shows the amount thus far mined. [For the above we are indebted to Bedford's *General Science*.]

amount of coal in reserve. The most authentic estimate that has been made is that under the

direction of the International Geological Congress, which gives for the world 7,000,000 million tons (7,000,000,000,000), of which 5,105,000 million tons (5,105,000,000,000) are in the United States. While the mind utterly fails to grasp the significance of these figures, it will be clear that at the present rate of consumption, we need not worry about shortness of coal for centuries to come.

At the present rate of consumption, it is declared the coal in the United States will last 6,000 years, but as it is being used incredibly faster every year, it is believed the supply now known to exist will be exhausted in less than a thousand years.

Products and By-Products. Reference was made above to the manufacture of water gas from anthracite, and to the production of coke from soft coal. Coal, in fact, is not merely a fuel, but is the source of hundreds of products and by-products indispensable in the arts, science, and industry. Coal tar, for example, so widely used in the manufacture of pavement material, roofing, and tar paper, is separated by distillation into scores of useful products, many of which are enumerated on the reverse of the full-page illustration (preceding pages, 1501 and 1502). One of the latest discoveries is a process for making wood alcohol from water gas, which, as noted above, is derived from coal. A study of the illustration and reference to the related subjects at the close of this article will make possible a comprehensive survey of the wealth stored in coal.

Coal-Mining

Coal occurs in veins which lie in a horizontal or an inclined position. Occasionally, the veins are near enough to the surface to be stripped of the overlying rock and worked as open quarries. In hilly or mountainous regions, the coal may be reached by a tunnel bored into the side of the hill or mountain. Deep veins and those found in level regions are reached by sinking a shaft, and this method is the one most frequently employed. In different parts of the world, the veins are in varying thicknesses. Some in Wales are thirty to forty feet thick; in India are veins about 200 feet in thickness. But these are very rare exceptions. In the United States, the average may be stated as from six to twelve feet, with veins overlying one another with rock layers between.

The Shaft. In America, shafts are usually square or oblong. They vary in size and depth. Where the veins are near the surface, it is more economical to sink small shafts at short distances from each other than it is to haul the coal from all parts of the mine through tunnels to one shaft. But in deep mines it is less expensive to use one shaft. Deep shafts sometimes extend downward over a mile. They are usually divided into compart-

ments, two of these are used for the elevators, or cages, on which the coal is hoisted to the surface and in which the miners are let down and hauled up from the mine; one is for



MINING BY THE STRIPPING METHOD

An increasing amount of coal is being mined in the United States by the use of steam shovels. This is possible only when the coal lies near the surface.

pipes, ladders, and pumping apparatus, and one for ventilation, or the same compartment may be used for pipes, ladders, and ventilation.

The shaft is lined with timbers, and over the mouth a strong frame, fifty or more feet high, is constructed for holding a part of the hoisting machinery. The cages are raised and lowered by a wire cable which passes over a large wheel at the top of this frame, then around a drum that is operated by a steam engine. There is a cable for each cage, and the arrangement is such that as one cage is hoisted the other is lowered.

Mining the Coal. The miners work from the foot of the shaft, following the vein in different directions. First they excavate the coal so



Photo. Visual Education Service

TIPPLE OF COAL MINE

Both the building and the apparatus are known by the name. Here loaded cars are emptied by tipping

as to form a large gallery or passage in one direction. This must be broad enough and high enough for cars to be hauled by mules or by an electric or steam locomotive. As fast as this passage is extended, a track for the cars is laid in it. The next step is to excavate other passages at as near right angles to the first as the position of the vein will permit. As the mining proceeds, tracks are laid in most of these passageways, all leading to the track in the main passage. All the coal is taken out except pillars, three or four feet square, which are left at frequent intervals to support the roof. The map of the passages in a coal mine would look like the map of a city's streets, except that the passages in the mine are more irregular and narrower.

The coal is loosened by hand picks and drills, by machinery, and by blasting. Hand tools are now used only when the miner begins a new excavation, and then only so long as is necessary to make an opening in which a machine drill or pick can be placed. These machines, which are driven by compressed air or electricity, will cut into the coal at from six to twelve inches a minute. One of these machines is a chain-cutter, which has knives attached to the links; the chain moves in either a horizontal

or a vertical direction, and as the chain moves over the coal the knives cut a channel. The machine is so mounted on a carriage that it can cut into the coal several feet. The miner usually makes his cut as near the bottom of the vein as possible; then he breaks the coal down by blasting with a light charge of powder.

The loosened coal is loaded into cars, which are run upon the main track, where in large mines they are joined into trains and hauled to the shaft by small locomotives. In some mines, these cars are hauled more than a mile.

Dangers and Remedies. Nearly 3,000 men are annually killed by accidents in the coal mines of the United States alone. For every 177,000 tons of coal mined, one man lays down his life. In other countries, the hazards of coal-mining are about as serious. Nearly half of these deaths result from falls of roofs and coal. To counteract this danger, pillars of coal are left in the mine to support the roof, or timbers are placed to prevent a cave-in. Explosions of gas and coal dust account for about one-fifth of these fatal accidents. The remainder result chiefly from blasting, moving cars, and electricity.

The gases which accumulate in coal mines, especially soft-coal mines, are *fire damp*, which is very explosive; *carbon dioxide*, which suffocates those who breathe it; and *carbon oxide*, the white damp of the mines, both poisonous and easily set afire. Gas explosions are generally local, and in themselves usually do not

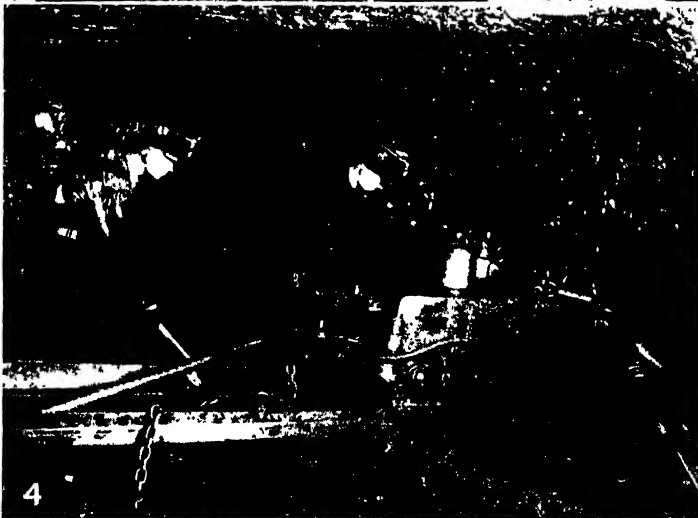


Photo. Visual Education Service

SEPARATING VARIOUS SIZES OF LUMPS

The coal is passed over shaker screens in which are holes of various sizes, through which the lumps drop.

cause the sacrifice of much life. They set off, however, the much-dreaded coal-dust explosions. Following an explosion, miners are sometimes suffocated by the formation of carbon dioxide, or choke damp. Canary birds have been found very useful in detecting choke damp, since they usually fall from their perches from its effect, before men breathing the same air feel distress.



The Mining of Coal. (1) Surface plant of a coal company. (2) Surveying in a mine. (3) Loading coal by modern conveyor system. (4) Undercutting, preparatory to blasting down for loading. (5) Using a flame safety lamp to detect dangerous gases.

1505

OUTLINE AND QUESTIONS ON COAL

Outline

I. Definition

- (1) Nearly all carbon
- (2) Relation to peat

- (a) Size of fields
- (b) Output
- (3) Great Britain
- (4) Germany
- (5) Other countries

II. How Coal Was Formed

- (1) Decayed vegetation
 - (a) Submergence
 - (b) Heat and pressure
- (2) Repetition of process
 - (a) Veins

V. Products and By-Products

- (1) Important derivatives
- (2) Innumerable products of derivatives

III. Varieties

- (1) Anthracite
 - (a) Graded according to size
- (2) Bituminous
 - (a) Cannel
- (3) Lignite

VI. Methods of Mining

- (1) Open quarries
- (2) Deep veins
 - (a) Shafts
 - 1. Number
 - 2. Size
 - 3. Division into compartments
 - (b) Actual mining operations
 - 1. Galleries and pillars
 - 2. Loosening the coal
 - 3. Bringing it to the surface
 - (c) Dangers of coal-mining, and remedies

IV. Where Coal Occurs

- (1) United States
 - (a) Appalachian coal fields
 - (b) In Eastern interior
 - (c) Rocky Mountains
 - (d) Size of fields
 - (e) Annual production
- (2) Canada

VII. Preparation for Market

- (1) Breaking
- (2) Screening

Questions

How can man imitate nature's work in making coal?

Where is the largest Canadian coal field? The second largest?

What country in Asia has very large fields, but averages a comparatively small output?

Why are canary birds sometimes kept in coal mines?

What, in comparatively recent years, indicated the importance of the coal-mining industry?

What is the undesirable feature of burning soft coal in closely built regions?

How many of the Canadian provinces have coal fields?

What is the greatest source of danger to coal-miners?

What is the difference between coal and peat?

What does the name "cannel" coal mean? Why is it appropriate?

If about 1,500,000,000 tons are used each year, how long will the world's estimated coal supply last?

What are the duties of a "breaker boy"?

What causes the difference between "man-made coal," or charcoal, and real coal?

What three countries take the lead in coal production?

Why do some mines have but one shaft, while others have several?

Describe the process or processes by which coal was formed.

How does lignite differ in looks from other varieties? Why is it not so well suited for manufacturing purposes as these others?

When is "open quarrying" possible?

A Booklet on Coal

Use three sheets of paper 9 x 12 inches, or larger, and fold once, making twelve pages.

Cover page—*Story of Coal* in center, made in "black diamonds."

Illustrations: At left side—ferns and other vegetation. At lower right side—pile of coal

Inside cover—Blank.

Page one—Essay, *Origin of Coal*—"Buried Sunshine"

Illustrations. Rank fern vegetation, coal with fern-leaf impression

Page two—Essay, *Mining of Coal*

Illustration: At left—shaft connected at bottom with cross-section of mine, with miners at work

Page three—Essay, *Kinds of Coal*—anthracite, semi-anthracite, bituminous, lignite.

Illustration Lumps of coal of various sizes.

Page four—Essay, *Uses of Coal*—in heating, manufacturing, transportation

Illustrations: Stove, furnace, steel mill, engine

Page five—Essay, *Coal in My County*—importance, location, development

Illustration. Outline map with shaded coal fields

Graphic Ten leading counties

Page six—Essay, *Coal in My State or Province*.

Illustration. Map with shaded area

Graphic Leading states or provinces.

Page seven—Essay, *Coal in Canada, or Coal in the United States*

Illustration Shaded map

Page eight—Original page suggested by teacher

Inside back cover—Blank.

Back cover—Poem on coal

In recent years, there has been a world-wide movement toward studying the causes and the prevention of coal-mine explosions. The resources of science and engineering have been drawn upon in devising methods and apparatus for rescuing miners quickly from danger following an explosion. Men wearing helmets and armed with artificial-breathing devices enter the death-laden atmosphere below, and bring the victims to the surface, where many are revived. The United States Bureau of Mines has done praiseworthy pioneer work in this field.

Preparation for Market. When anthracite comes from the mine, fragments of rock are mixed with it, and it is in larger lumps than are practicable for use. The coal is hoisted to the top of a high building called the *breaker*, where it slides down inclined chutes to the rolls, which break it into the various sizes at which it is placed on the market. Boys, on seats placed across these chutes, pick out the

fragments of rock as the coal passes along. These boys, called *breaker boys*, become very skilful and will detect rock where an inexperienced person would not see it. After the coal passes through the breakers, the sizes are separated by screens. These sizes, in order, from the largest commercial form to the smallest, are *furnace*, *egg*, *small egg*, *stove*, *nut*, and *pea*.

Soft coal is usually run over a screen to clean it of dirt and small fragments, after which it is ready for sale. Some mines, however, wash small sizes, and assort them by screening, placing them on the market as "washed coal," which is a desirable fuel. E.S.

Related Subjects. The following articles in these volumes will give added information as to coal, its method of formation, and other related topics

Aniline	Distillation
Carboniferous Period	Dyeing and Dyestuffs
Catalysis	Fuel
Charcoal	Gas
Coal Tar	Geology
Coke	Mining
Conservation	Peat
Diamond	Pennsylvania (Minerals)

COAL GAS. See GAS, subhead.

COALITION, *ko a lish' un*, in domestic or international politics, a temporary alliance of political parties or nations for a definite purpose. When the emergency for which the alliance was made has passed, the former status is resumed. An excellent example in domestic politics is the coalition Ministry formed in Great Britain in 1914, soon after the beginning of the World War; its Premier was a Liberal, but it included among its members men of all shades of political opinion, all willing to sink their differences in the great need of their country.

In international politics, important coalitions have been directed against France, first in the days of Louis XIV and later in the Napoleonic era. The great coalition against Louis XIV, known in history as the *Grand Alliance*, comprised England, Spain, Sweden, Holland, and all Germany, and it had the secret support of the Pope and many of the Italian princes. This coalition came to an end at the Peace of Ryswick.

The first coalition against France in the Napoleonic era was formed by the same countries, with the exception of Sweden, in 1793, and lasted until 1795. The second coalition, formed in 1799, comprised England, Russia, Austria, Naples, Portugal, and Turkey. This coalition was broken in 1801 by a treaty of peace between Austria and France, but a third one was formed in 1805 between England, Russia, Austria, Turkey, Sweden, and Naples. The fourth coalition is usually called the *Great Coalition*; it included nearly all the nations of Europe, and resulted in the final fall of Napoleon, in 1815.

In 1914 and 1915 over twenty nations joined in a sort of coalition, took the name of the Allied Nations, and fought the Germanic powers in the World War.

Related Subjects. The reader is referred in these volumes to the following articles:

Napoleon I Ryswick, Peace of World War

COAL OIL. See PETROLEUM.

COAL TAR, OR GAS TAR. In the manufacture of illuminating gas from bituminous coal, a thick, sticky, dark-colored substance with a disagreeable odor is obtained as a by-product. This is *coal tar*, one of the most useful substances known. It is important in the manufacture of roofing and tar paper, is utilized in making road pavements, and enters into the production of a commercial disinfectant. Coal tar contains a large number of substances which can be separated from it and from each other by distillation. These derivatives give us beautiful aniline dyes, perfumes, drugs, explosives, and numerous other articles in everyday use. Since the World War, the coal-tar industry, formerly almost monopolized by Germany, has been developed in both the United States and Canada.

Important Derivatives. The following include the more important derivatives of coal tar:

Anthracene, a colorless crystalline substance, insoluble in water and but slightly soluble in alcohol. It is used in the manufacture of alizarin, the coloring matter found in madder (see ALIZARIN).

Benzene, a colorless liquid used in the manufacture of aniline. See BENZENE.

Carbolic Acid, a valuable antiseptic. See CARBOLIC ACID.

Creosote, a preservative of wood. See CREOSOTE.

Naphthalene, a crystalline substance soluble in ether and hot alcohol, used in the manufacture of coloring matter. When acted upon by chlorine, nitric acid, and other chemicals, it yields various derivatives valued by dyers.

Pyridine, a nitrogenous base found in nicotine and other plant alkaloids. It is used in denaturing alcohol and as a germicide.

Toluene, a colorless liquid used in making dye-stuffs, explosives, drugs, photographic chemicals, and perfumes. It is a constituent of the powerful explosive T N T. See EXPLOSIVES. T B J

Related Subjects. In addition to the references given above, the reader is referred to the following articles.

Aniline Dyes and
Distillation Dyestuffs

COASTAL PLAIN. See PLAIN, subhead; UNITED STATES (Size: Coast Line).

COAST AND GEODETIC, *je o del' ik*, SURVEY, a bureau of the United States government which had its beginning as far back as 1807, when Congress, at the suggestion of President Jefferson, authorized the establishment of the national Coast Survey as a bureau under the Treasury Department. The Coast Survey was actually organized in 1816, but

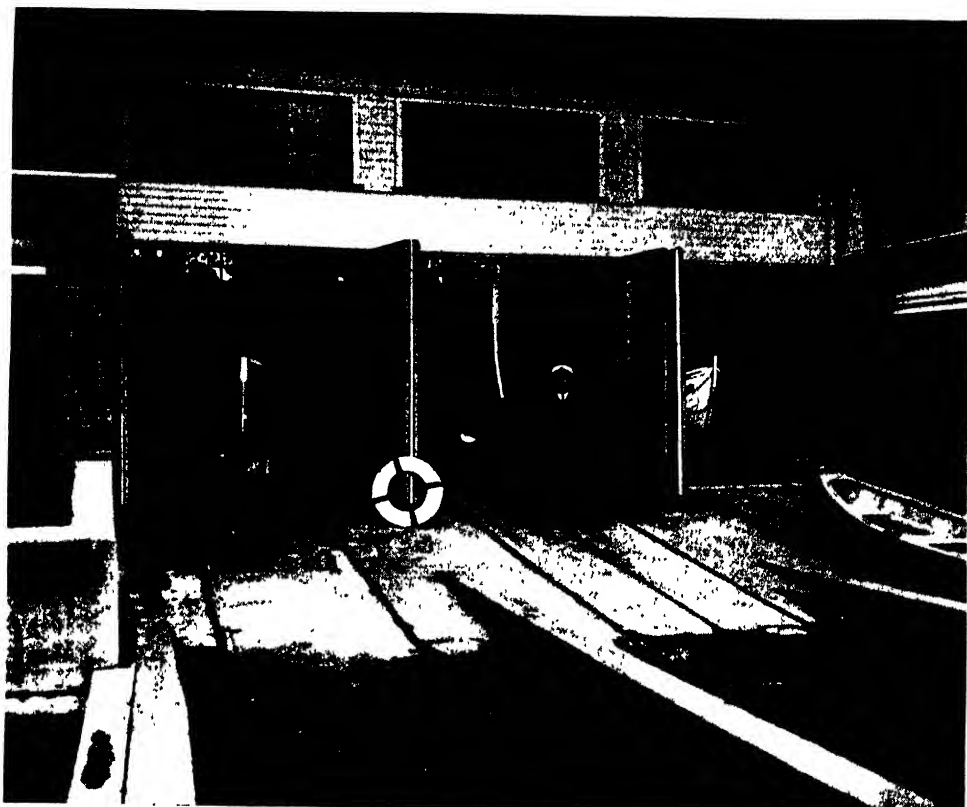
little actual work was accomplished before 1832. In 1871 the scope of the Bureau was enlarged to furnish geographic positions and other data for state surveys. In 1878 it became the Coast and Geodetic Survey; it was transferred to the Department of Commerce and Labor in 1903, and to the Department of Commerce in 1913.

Work of the Bureau. The Coast and Geodetic Survey operates under two divisions—field and office. The chief function of the field force is charting the coasts of the United States and its island dependencies. Some idea of the magnitude of the task may be gathered from the fact that while the general coast line of the United States and Alaska is 11,500 miles in extent, and that of the Philippines, Hawaii, Porto Rico, Guam, and Tutuila is 5,400 miles, the actual shore line, which includes all the islands, bays, sounds, and rivers in the tidal belt, is 103,000 miles—91,000 for the United States and Alaska and 12,000 for the latter group. The topographic work extends only three to four miles from the coast, but the ocean is charted out as far as necessary for safe navigation.

The *geodetic* work of the Bureau consists of spherical surveying, or earth measurement. This includes triangulation, first-order leveling, and astronomic observations. By triangulation the accurate positions of stations are obtained, as well as the distance between them. This furnishes the control for all other public surveys, including state and national boundaries, and often for city surveys, as well. From the first-order leveling are obtained the accurate elevations of a great many marks referred to mean sea level, and these are used by surveyors and engineers for the control of local work.

The Survey has covered the entire United States, in a general way, with a network of triangulation and first-order levels. The Survey also studies the features of terrestrial magnetism in different localities, makes seismological investigations, produces airway maps for aviators, and records tides and tidal currents. In the geography of the ocean, it pays attention to the physical characteristics of the ocean—its currents, density, temperature, etc.

In the office of the Bureau, the results of the field work are computed, and charts are made from original surveys; these are engraved, printed, and sold for the actual cost of paper and labor. The publications of the Bureau consist of about 700 different charts, covering all the coasts of the United States and outlying possessions; annual tide tables for all the leading ports in the world; coast pilots, furnishing sailing directions for all navigable waters along the coast; special publications, giving geographical positions, first-order leveling results,



A TYPICAL COAST GUARD STATION

Photo: Chicago Tribune

and other useful data, in a form suitable for surveyors and engineers; data for magnetic stations; and special reports which give the results of scientific research.

R.L.F.

COAST GUARD. Those who "go down to the sea in ships" from the ports of nearly all countries in the world north of the equator, except China, know that everywhere dangerous shores are patrolled by men skilled in the most scientific means of saving life. In most countries, this humane service is supported by private contributions. In four only does the government assume its organization, management, and expense. The South American republics, the vast stretches of African coasts, and the semi-civilized Asiatic countries afford no means of saving life other than unorganized effort. The present article deals with such efforts in the United States only. For an account of other nations, see **LIFE-SAVING SERVICE**.

A Change in Name. Until 1915, dating from its organization in 1871, the Life-Saving Service of the Federal government was officially known by that name, and it existed as a bureau of the Treasury Department. On January 28, 1915, by an act of Congress, it was reorganized,

and another bureau, the Revenue-Cutter Service, was transferred to the same bureau, and the two became the Coast Guard. The new law contained the following provision:

There is hereby established in lieu of the existing Revenue-Cutter Service and the Life-Saving Service, to be composed of those two existing organizations, the Coast Guard, which shall constitute a part of the military forces of the United States, and which shall operate under the Treasury Department in time of peace, and operate as a part of the navy, subject to the orders of the Secretary of the Navy, in time of war

Organization. The officers of the Coast Guard are on the same footing, with respect to pay and rank, as the officers of the army and navy; indeed, the Guard is an integral part of the military arm of the nation. The Coast Guard stations, which doubtless will continue to be popularly known as life-saving stations, are nearly 300 in number, and are scattered throughout more than a dozen districts into which the country has been divided, embracing the Atlantic, Gulf, Pacific, Great Lakes, and Alaska. Not all stations are on tidewater, for one is located at the Falls of the Ohio, near Louisville, Kentucky. Most of



Photos: U & U

A Day's Work. A Norwegian steamer was on the shoals in the Atlantic Ocean. The Coast Guard launched its lifeboat in the manner shown, and succeeded in saving the lives of the endangered crew. Below is a picture of the rescuers, only four in number, who accomplished the dangerous task. The vessel could not be salvaged.



Photos: P & A

Varied Duties. Above, a line is shot from shore to a stranded vessel; it will bring heavier ropes ashore, on which the crew may reach land in breeches buoys. Below is a frozen bell buoy. It is the duty of the Coast Guard to keep the buoys free from ice; otherwise they would be soundless.



Photo P & A

THEY TRAIN THEMSELVES TO SAVE LIVES

A Coast Guard crew in the act of capsizing one of its boats. In this drill, the men become familiar with the method necessary in handling a boat which may be capsized while at sea

the stations are maintained throughout the year, but some of them, particularly on the Great Lakes, where there are sixty-two stations, are closed during the winter months, when navigation is suspended.

Equipment. Each Coast Guard, or life-saving, station is equipped with a serviceable building for living quarters for the guardsmen, seven to nine in number, and for boats and equipment. A surf boat is provided, from 22 to 27 feet in length, and of 6 to 7 feet beam, containing air chambers to render it unsinkable, or a self-bailing and self-righting boat about 36 feet long, air chambered, and equipped with a gasoline engine, sail, and oars. There are also a breeches buoy; a life car of metal, open at the top, which operates on the breeches-buoy principle; a small cannon, which fires an iron rod at the end of a light rope, to connect with a vessel in distress so that heavy ropes may be attached for the operation of the breeches-buoy; rockets for night signaling; a pulmotor; life-buoys, and a beach cart to transport the above apparatus.

Following is a brief description of the more important life-saving items not explained above:

A life-buoy is a device for keeping persons afloat in deep water. The commonest kind is a canvas belt filled with cork, which the wearer fastens about his body under the arms. It must be buoyant enough to support at least two persons for a considerable time. Another style of buoy consists of a sort of jacket, constructed of plates of cork held together by a stout casing. Each of these buoys is commonly known as a *life preserver*, and no passenger vessel or freight boat may sail without such equipment. Since such disasters as the *General Slocum* fire in New York and the *Titanic* loss, laws relating to number and quality of life-buoys have become more strict. There must be on all vessels as many life preservers as there are people aboard.

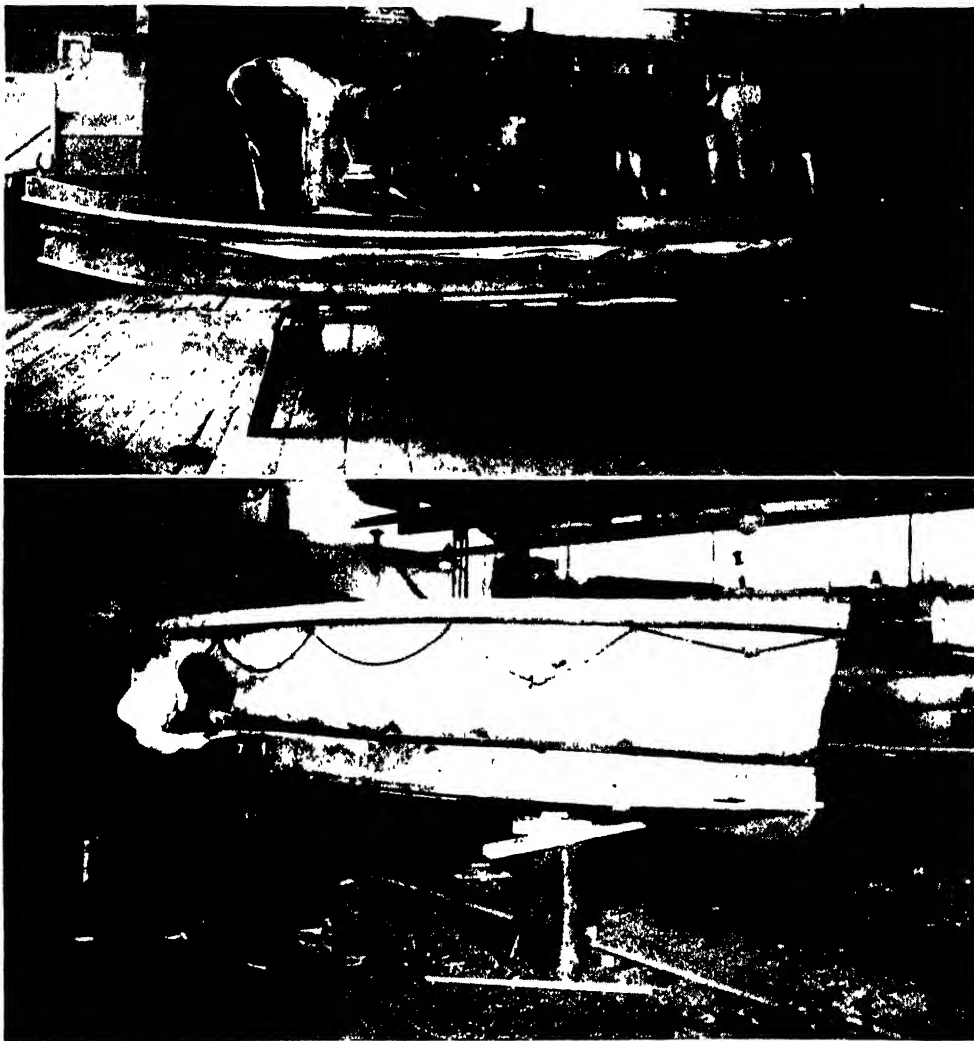
A life-saving gun is a mortar capable of hurling an arrowlike projectile or other missile from the shore to a vessel in distress. The projectile carries a light rope, with which the ship's crew can haul a heavy hawser aboard. When this has been accomplished, passengers and crew may be conveyed to safety by means of the breeches buoy, traveling over the line. A rocket is often substituted for a gun. At its head it carries a coil of rope, which runs out as the rocket approaches its object.

Some of the guns that are used have a range of 700 yards, and the more powerful rockets can reach objects 1,000 yards distant.

Service Rendered. The cost to the government of maintaining the Coast Guard runs as high as \$11,000,000 per year. The vessels in distress which are given aid during a year are worth on the average, with their cargoes, from \$40,000,000 to \$55,000,000. Over 2,000 vessels per year are seized for violation of Federal laws, and their owners pay from \$500,000 to \$600,000 in fines and penalties. An average of 3,000 persons are annually rescued from peril of the seas, while the number of persons on vessels in distress, and therefore in potential danger of their lives, may average 20,000. An average of over 45,000 vessels are boarded each year for the purpose of examining the ships' papers.

Early Organizations. As early as 1807 benevolent organizations placed life-saving apparatus along the Massachusetts coast; the New Jersey shores, approached by a greater number of vessels, were equipped by the government with apparatus, but it was used by volunteers, for no Federal appropriations for salaries were made until the organization of the Life-Saving Service in 1871.

Revenue-Cutter Service, since 1915 a part of the organization of the Coast Guard, is an armed maritime service of the Federal government. It has existed since 1790—seven years before the first United States war vessel



COLLAPSIBLE LIFEBOATS

Photo. Keystone

In the first illustration, a collapsible boat is in a flat position; the men are in position to extend it into shape for use. Below is the collapsible boat ready for service. It will hold about twenty people, and is sufficiently strong to withstand the angry waters of a rough sea.

was launched. The first revenue-cutter fleet consisted of ten small, single-masted sailing vessels, each with a crew of ten. To-day the revenue-cutters range in tonnage from 400 to 2,000, and of vessels of all classes there are over one hundred.

Duties. The most important work of the Revenue-Cutter Service is rendered, in time of peace, in the enforcement of statutes affecting the country's interests at sea. This includes customs, neutrality, and quarantine laws; the destruction of derelicts (boats which have been abandoned); the suppression of mutiny, piracy, and illegal traffic in firearms and liquor; the inspection of lighthouses; and the examination

of the condition and life-saving equipment of vessels.

Certain cutters are detailed to coast-patrol service on both seaboard for the purpose of giving aid to steamers in distress and of caring for the shipwrecked. Other boats patrol Alaskan waters from May to December, to protect the seal fisheries, to rescue lost or wrecked seamen, and to give medical aid to the scattered inhabitants of the coast. In these waters alone, the service has rescued hundreds of whalers who otherwise would have perished. It is said that the revenue service "blazed the way to Alaska," and for many years after that possession was acquired, the cutters

were the only representatives of the authority of the government in the waters north of Sitka.

One vessel is detailed to give medical aid to the fishing fleets of the North Atlantic, and by an international agreement among the great maritime nations, several cutters patrol the ice fields of North America to guide and aid ships. A number of cutters are assigned to service on the Great Lakes during the navigation season, and others are detailed to harbor duty.

[See illustration of Coast Guard service, in the article ICEBERG.]

The officers are commissioned by the President, with the approval of the Senate. The captain commandant is the highest officer, and he is under the orders of the Secretary of the Treasury (except in war time). Cadets are required to complete a three months' course of training in the Coast Guard Academy at New London, Conn., after which they are commissioned as lieutenants. Men are promoted only after passing rigid mental and physical examinations. Cadet engineers are required to serve a probationary period of one year at the New London Academy. Strict naval discipline and routine are maintained, and the ships are kept in readiness for long voyages in the performance of duty.

COAST RANGE, a range of mountains in the Western United States and Southwestern Canada, made up of a number of smaller ranges, which contribute largely to the wealth of the country, by reason of their valuable mineral products. This range extends almost the entire length of California, across Oregon and into Washington and British Columbia, and forms the southwestern boundary of the great central valley of California; there it consists of a series of great ridges. Between these ridges are long and narrow valleys which, because of a remarkable system of irrigation, are noted for fertility and beauty.

The Coast and Sierra Nevada ranges, which interlock near Mount Shasta on the north and near Santa Barbara on the south, are unsurpassed in the production of mineral products; gold, formerly the chief product, has been superseded by petroleum in respect to value of output. The manufacture of cement and asphalt is of first importance among the mineral industries; silver, copper, zinc, quicksilver, and borax are found in the mountain slopes and foothills. Among the best-known summits of the range, which rise to heights of from 2,600 to 4,200 feet, are Diablo; Hamilton, the site of the famous Lick Observatory; and Tamalpais, the latter overlooking the Golden Gate, or San Francisco Bay.

COATESVILLE, PA. See PENNSYLVANIA (back of map).

COAT OF ARMS. See HERALDRY.

COBALT, *ko' bawlt*, a silver-white metal, resembling iron in its physical and chemical properties, and still more closely related to nickel (which see). Nickel and cobalt are often found in the same ore. The symbol of cobalt is *Co* (see CHEMISTRY). Pure cobalt is heavier, harder, and stronger than iron, and does not rust or tarnish. It takes a good polish and, like nickel, can be used for plating other metals. The metal is not in much demand because nickel, which costs less, usually serves the same purpose. The compounds of cobalt are used to a considerable extent as coloring matters. *Cobalt blue*, *coculcum*, *new blue*, and *small* are blue pigments used by artists, and there are, besides, *cobalt yellow* and *cobalt green*. Cobalt oxide is used to color glass and enamels blue.

Cobalt chloride is used as a so-called *sympathetic ink*. If a weak solution of the compound (which is pink) is used to write on rose-colored paper, the writing is invisible, but when the paper is gently heated, the pink substance turns blue, and the writing appears. If a piece of blotting paper or of light calico is dipped into a solution of one part cobalt chloride and ten parts gelatin to 100 parts water, and dried, it will be blue in very dry weather, violet in weather of medium humidity, and pink in wet weather, thus serving as a crude weather indicator. Cobalt is found in largest quantities at Cobalt, a town in Ontario.

T.B.J

COBB, IRVIN SHREWSBURY (1876-), a newspaper man, short-story writer, novelist, and dramatist, born at Paducah, Ky. He received his early training in journalism as shorthand reporter for various papers and as a contributor to humorous weeklies. When nineteen years of age, he became editor of the *Paducah News*. In 1904, after several years of newspaper work in various cities of Kentucky, he removed to New York City, where he became a special and humorous writer on the



Photo. U & U

IRVIN COBB

Evening Sun and the *New York World*. After the outbreak of the World War in 1914, he represented the Philadelphia *Saturday Evening Post* as war correspondent in Europe; and in 1915 he lectured in all the leading cities of the United States on his experiences at the front. His many contributions to war literature include *Europe Revised* and *Paths of Glory*. Cobb has written vaudeville sketches and monologues, as well as several plays, including *Under Sentence*, *Funabashi*, and *Mr. Busybody*.

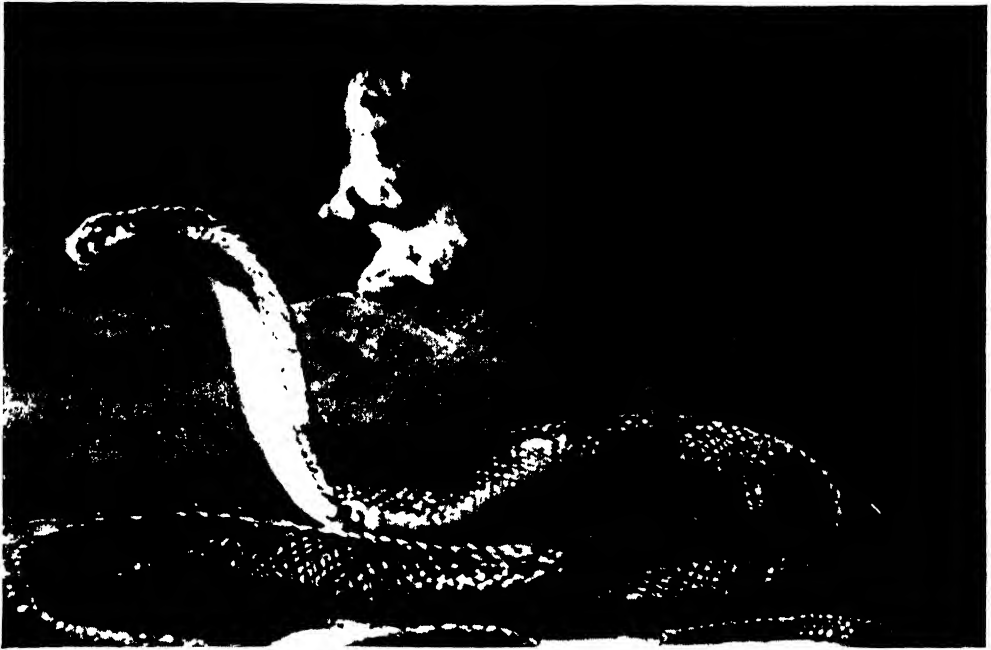


Photo: U & U

A BATTLE IS ABOUT TO BEGIN

The tiny mongoose in the background is preparing to spring upon the head of the giant cobra. As shown, this small enemy is out of range of the serpent's eye, awaiting the proper moment to attack.

He is also the author of several books, among them *Back Home*, *Ole Judge Priest*, *From Place to Place*, *The Abandoned Farmers*, *A Laugh a Day*, and *Here Comes the Bride*.

Cobb's writings have a freshness and an originality which give his readers constant delight. People read what he writes both to be amused and to be informed. An example of his blending of fact and fancy occurs in an essay on *Kentucky*, his native state:

The state of Kentucky is shaped like a camel lying down. The straw that broke the camel's back was the first time the state went Republican.

COBDEN, RICHARD (1804-1865), an English statesman and political economist known as the "apostle of free trade." His father was too poor to give him a good education, and at the age of fifteen the boy found work in a London warehouse. He labored diligently, studied at night, and learned everything he could about business, and by 1831 had become a partner in a calico-printing establishment. In 1835 Cobden published an epoch-making pamphlet, *England, Ireland, and America*, and in 1836 a pamphlet, *Russia*. In these he set forth the theory to which he adhered throughout his life, that the foundation of prosperity is free intercourse between the nations. He was one of the earliest English leaders in the movement for free trade, and when he entered Parliament, in 1841, he began a crusade against

the Corn Laws which resulted in their repeal five years later. During the critical days of the War of Secession in America, Cobden was one of a very few Englishmen of note who protested against British recognition of the Confederate States of America as a belligerent nation.

Related Subjects. The reader is referred in these volumes to the following articles:

Bright, John

Corn Laws

Free Trade

COBEQUID MOUNTAINS. See NOVA SCOTIA (Surface and Drainage).

COBH, kohl, formerly Queenstown, a city of the Irish Free State. See IRELAND (The Cities).

COBLENZ. See GERMANY (Cities).

COBRA, OR COBRA DE CAPELLO, ko' bra de ka pel' o, a very poisonous hooded snake which infests all India and Ceylon; it is found in the Himalaya Mountains at altitudes as great as 8,000 feet. A related hooded snake, not quite so dangerous, is found in most parts of Africa (see ASP). The king cobra, about twice the size of the true cobra and very venomous, is also found in all parts of India, and is said to eat only snakes. Several cobras are to be found in the large markets of the East, where they are sold for food.

The full-grown cobra is nearly six feet in length and has a girth of about six inches. In color it is yellowish to dark brown, with a

large black and white spectacle mark on the back of its head, from which it is sometimes called the *spectacled snake*. It feeds on such small animals as frogs and lizards, and it is especially fond of birds' eggs, often climbing trees in search of the latter. It has been known to swim across rivers. When the cobra goes out to seek food, it is a most terrifying sight. The deadly serpent glides along the ground with the upper third of its body erect, its hood puffed out, and its eyes glaring. It hisses loudly when it prepares to strike. An enemy the cobra dreads is the tiny mongoose, which attacks it with ferocity and is usually able to kill it. See MONGOOSE.

The bite of the cobra will cause death in a few minutes, and there is no known antidote for it; however, prompt amputation or cauterizing will sometimes save life. As it is found every-



Photo. Wide World

THE HOODED COBRA

The hooded, or spectacled, cobra is a true albino (see ALBINO). A naturalist has said that it is "more subtle than any beast of the field which the Lord God has made."

where in fields and jungles, and even enters huts, it is estimated that from 15,000 to 20,000 natives, as well as thousands of cattle, perish each year from its bite. Perhaps there would not be so many of these reptiles if the natives were not too superstitious to kill them. The cobra is very revengeful, and, it is said, will pursue anyone who injures it until it kills him.

The jugglers and snake charmers of India usually select the cobra for exhibition purposes, carrying the hideous creatures around the country in baskets and making them perform at the sound of the flute; and it is not unusual to see one of these snake charmers trudging down a dusty road in India with half a dozen wriggling, hissing serpents around the upper part of his body. It is said that the fangs of the snake are extracted, but this is not always the case. See SERPENT CHARMING. By allowing themselves to be bitten by small animals with little venom, these men may develop an immunity to the poison of this snake.

L.H.

Scientific Name. The cobra belongs to the family *Elapidae*. It is known as *Naja tripudians*

COBWEBS, the irregular webs spun in neglected corners by certain types of spiders. See SPIDER.

COCA, *ko' kah*. See COCAINE.

COCAINE, *ko' ka in*, also *ko kane'*, a bitter alkaloid prepared from coca leaves. Cocaine is a valuable drug if properly used, but in large doses it is poisonous, and when taken habitually, it causes moral and physical degeneration. It acts first as a nerve and heart stimulant, and then as a narcotic, dulling the sensibilities. Dentists use it as a local anesthetic, and oculists employ it as a drug to dilate the pupil of the eye. Within recent years it has also been successfully employed in surgical operations, especially those of the nose and throat. When it is injected into the spinal canal, the entire body below the point of injection becomes insensible to pain. To be effective, cocaine must come in contact with mucous surfaces or be injected beneath the skin.

Cocaine is one of the worst of habit-forming drugs. Its continued use causes sleeplessness, nervous twitching, mental and moral weakness, and certain death. Its presence in some patent medicines has in many cases started this deadly habit. A "coke fiend" will lie, beg, steal, or do anything to obtain this drug. In 1914, when the Harrison Act prohibited the sale of cocaine in the United States except under a physician's prescription, many habitual users were nearly crazed for want of it. As a result, benevolent societies were kept busy trying to furnish relief to the victims and to bring them back to a normal moral and physical state.

W.A.E.

Coca, the shrub from whose rusty leaves cocaine is made, is native to South America, but is now also cultivated in Ceylon, India, and Java. It grows from three to six feet high, and bears yellow flowers. The South American Indians, especially in Peru and Brazil, chew as a stimulant the dried leaves mixed with finely powdered chalk. A small quantity will enable a person to resist fatigue and for a time to need less food, and it makes breathing easier in mountain climbing; but the reaction is always depressing. This habit, like the use of the drug, is also detrimental.

Classification. The shrub belongs to the flax family, *Linaceae*. Its scientific name is *Erythroxylum coca*.

COCCYX, *kok' siks*. See PELVIS; SKELETON.

COCHABAMBA, *ko chah bahm' bah*. See BOLIVIA (The Cities).

COCHIN-CHINA, *ko' chin chi' nah*. See FRENCH INDO-CHINA, subhead.

COCHINEAL, *koch' i neel*, a natural dye-stuff used for the production of crimson and scarlet tints, and for the preparation of carmine (which see). It is derived from the bodies of minute scale insects called *cochineal*, native to

Mexico and Central America. Countless swarms of the insects are brushed from cactus plants, upon which they feed, and are killed by immersion in hot water or by exposure to the sun, steam, or the heat of an oven. The dye is prepared from the dried bodies of the females. It requires 70,000 of these to make a pound of coloring matter. The insects have been introduced into Spain, Algeria, and Java, but the industry has fallen off greatly with the development of the coal-tar dyes. Cochineal dye was formerly used to color the scarlet coats of the British soldiers, and is still employed for dyeing handmade rugs. The color is not fast to light. See DYEING AND DYESTUFFS; CACTUS.

T.B.J.

COCHLEA, *koh' le ah*. See EAR (The Internal Ear).

COCKATOO, *koh a too'*, a climbing bird of the order of parrots, the sulphur-crested species of which is an object of interest in zoological gardens. The cockatoos are natives of Australia, the East Indies, and neighboring islands, but are found in captivity elsewhere, especially in Europe, for they can be tamed easily. Unlike parrots, however, they can be taught only a few words. Their cry is harsh and unmusical, and its sound suggested the name. Cockatoos have large, hard bills, highly curved; long wings, and long, broad tails, which are usually rounded. They can raise or lower their crests and expand them like fans at will. True cockatoos have whitish plumage, but the name is extended to allied species whose plumage is tinged with red, orange, yellow, and other colors. New Guinea is the home of the great black cockatoo, the largest of the order. See PARROT.

D.L.

Scientific Names. Cockatoos are placed by some naturalists in the family *Cacatuidae*, by others, in the subfamily *Cacatuinae* in the family *Psittacidae*. True cockatoos belong to the genus *Cacatua*.

COCKBURN ISLAND. See MANITOULIN ISLANDS.

COCK FIGHTING, a cruel sport which consists of pitting gamecocks against each other and permitting them to fight to the death. This amusement originated in the Far East, is mentioned in the earliest Chinese records, and was also a source of enjoyment to the ancient Greeks and Romans. From Rome it spread to the various countries of Northern and Central Europe, and was later introduced into America. The training and breeding of cocks for fighting became an important industry in Great Britain a hundred years ago, and

large sums were wagered on the results of the battles. Cockfighting is now illegal except in the Orient, in Spain, and among peoples of Spanish origin. Elsewhere humane laws have abolished this so-called sport.

COCKLEBUR, *koh' l bur*, OR **CLOT BUR**, any one of various species of weeds belonging to the Composite family. They are characterized by the possession of spiny burs, within which are found the seeds, usually two to a bur. One of these germinates a season ahead of the other. The seed pods, covered with sharply hooked prickles, stick to one's clothing or to the hair of cattle, and in sheep-raising districts do great damage to the wool, from which they can be disentangled only with great difficulty. Hogs and young cattle are sometimes killed by eating the burs, which either are poisonous, as some authorities believe, or else cause death by choking the throat and intestinal tract and lacerating the internal membranes. Cocklebur is a coarse annual plant, growing from one to three feet high, and bearing rough, heart-shaped leaves.

The pollen-bearing flowers grow on the upper branches and the seed-bearing ones on the lower. To exterminate cocklebur, it is necessary to destroy the plants before the seeds ripen, but special efforts have to be made to prevent new plants forming from the seeds that germinate in the second season. B.M.D.

Botany of the Cockleburs. These weeds belong to the family *Compositae* and to the genus *Xanthium*. One of the most common species, the spiny cocklebur, *X. spinosum*, was introduced into America from Europe. There are several native American species.

COCKLE BUTTON. See BURDOCK.

COCK OF THE ROCK, a handsome South American bird, with rich orange plumage and a prominent, flat-sided crest. The bird is so named because it builds its nest of mud on the rocks. These birds dwell along the rocky streams and on bushy hillsides in the lower Amazon Valley. The males gather together during the mating season and woo the females



Photo: U & U

THE COCKATOO



COCK OF THE ROCK

by dances and other peculiar antics. As the plumage of the birds is much sought for the millinery trade and by Indians for decorative purposes, the species is becoming rare. D.L.

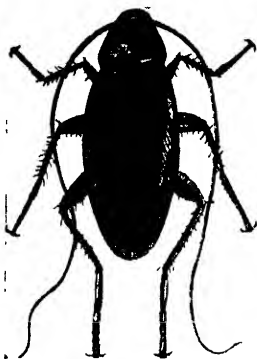
Scientific Name. The cock of the rock belongs to the subfamily *Rupicolinae* of the family *Cotingidae*. The species described above is *Rupicola rupicola*. There are three other species.

COCKPADDLE. See LUMPFISH.
"COCKPIT OF EUROPE," a term applied for many years to Belgium (which see).

COCKROACH. Cockroaches are among the most persistent and disagreeable of the insect pests that infest dwelling houses. The thousand or more species are found all over the world, and can boast an ancient lineage, for cockroaches were the dominant insects in the coal-making (Carboniferous) period of geologic times. A roach is easily identified. The flattened, slippery body, with its leatherlike, shiny casing; the long, strong, bristle-covered legs; the thin, lengthy antennae, or feelers, belong to a creature not easily mistaken for any other insect. Bakeries, groceries, office buildings, restaurants, hotels, flour mills, and libraries, as well as homes, are infested, for roaches will eat anything—food, garbage, clothing, furniture, bookbindings, and other insects, including bedbugs. They are well fitted to slip through cracks and crevices, and when the lights are out at night, they emerge in droves from their hiding places in search of something to eat, swarming over and contaminating everything that is explored.

The most common species in America are the *croton bug* of the Eastern states, a German cockroach whose name refers to its connection with the Croton waterworks system of New York City; and the *Oriental cockroach*, or *black beetle*, more prevalent in the South and Middle West. The croton bug is smaller than the Oriental roach, but is more prolific and destructive. It is a pale yellowish-brown, with two dark stripes on the fore part of the body.

Control. Dirt, grease, moisture, and bad air are favorable to cockroaches. At the same time, many good housekeepers are annoyed by these pests. Roach powders, which contain such ingredients as sodium fluoride, borax, or



COCKROACH

Natural size of the species in warm climates, as the Southern United States. The cockroach of cooler zones is about one-half as large

pyrethrum, may be dusted into crevices and hiding places, particularly around sinks and water pipes, or boiling water may be poured down. There are various methods of trapping these insects. An English plan is to put some molasses on a board and set it afloat in a basin of water. The insects will be so anxious to get the food that many will drown trying to reach it. W.J.S.

Classification. Cockroaches comprise the family *Blattidae*, in the order *Orthoptera* (which see). They are related to locusts, grasshoppers, and crickets

COCKSCOMB, koks' kome, an odd-appearing, easily cultivated plant, bearing brilliant flowers, which in some varieties take a frilled, crested form like the cock's comb. In light, rich, moist soil, the cockscomb will bloom from midsummer until frost. It is very popular as a border plant, with its colored, long-stemmed leaves and gay flowers. Cockscombs range through all the lovely shades of red and yellow, some of the flowers are stiff crests, while other varieties are waving and graceful, like ostrich feathers. Though a native of the tropical regions of America, Asia, and the East Indies, the cockscomb is now grown throughout the United States. B.M.D.

Scientific Name. The cockscomb belongs to the family *Amaranthaceae* (see AMARANTH). Its botanical name is *Celosia cristata*

COCKSPUR. See SAND BUR.

COCOA, ko' ko, originally *ko ko' ah*, is a reddish-brown powder obtained by grinding the kernels from the seeds of the cacao, or cocoa, tree. It is widely used in making the popular table beverage known as cocoa. The name, now in general use in English-speaking countries, is a corruption of the more correct form *cacao* (which see).

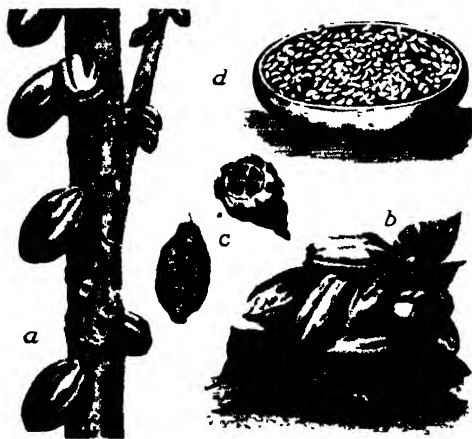
The Tree. The cocoa is a small tropical evergreen tree cultivated extensively in Mexico, Central America, the islands of the West Indies, Ecuador, Venezuela, Brazil, Cuba, Portuguese East Africa, the Gold Coast of Africa, and Ceylon. Heat, moisture, and a deep, rich soil are the conditions which favor its growth. The straight, regular trunk usually attains a height of twenty to thirty feet, and puts forth branches which bear shining, oval leaves, dark green above and red underneath.

The flowers, which have five narrow, bright-red petals, grow directly from the trunk or the older branches, and are almost stemless; the fruit, a cucumber-shaped pod with a thick, deeply grooved rind, has the same peculiarity, as may be seen in the accompanying picture. Each pod contains many almondlike seeds, covered by a thin, reddish-brown shell, and within each of the seeds is a dark-brown kernel, the valuable portion of the plant. The seeds have the commercial name of *cocoa beans*, while the kernels are called *nibs*.

Preparing for Shipment. Much of the work of getting the beans ready for shipment is done by negroes. After the pod is picked, a slit is made in the side with a knife; the pods are then broken open with the hand, and the beans and their enveloping pulp are scooped out and carried to the sweating house, to go through a process of fermenting. This fermentation makes the pulp easily removable, and also improves the quality of the kernel.

From the sweating house the beans are taken to sieves or troughs and stirred under water until they are clean and smooth. They are then dried, either in the sun or by artificial heat. Finally, in order that the beans may be protected against mold and fungous growths, they are finished, or polished; they are then placed in bags or barrels for shipment.

Manufacture of Cocoa Products. Powdered cocoa, chocolate (which see), and cocoa butter are the chief products of the cocoa beans. In the process of manufacture, the seeds are roasted and the shells removed, and the kernels, or nibs, are placed in a grinding mill with steam-heated rollers. Because of the heat, the cocoa mass flows out of the mill in a semi-liquid state; it is then run into deep pans and allowed to harden. If cocoa is to be made, the mass is remelted and placed in a great press which extracts a large proportion of the fat. The substance is then taken from the press and reduced to a fine powder in a mill consisting of a pair of rollers armed with teeth.



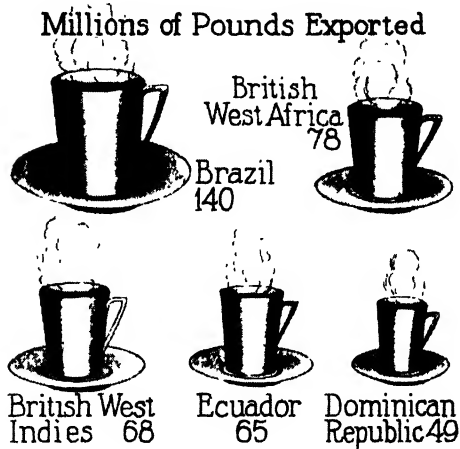
COCOA

(a) How the pods grow on the tree; (b) pods with the shells removed; (c) longitudinal and cross-sections of pod; (d) beans removed from pod

Before it is placed on the market, the powder is pulverized in a second mill, then is subjected to a thorough sifting.

Chocolate is the cocoa mass with the fat left in. If sugar and flavoring are added, the product becomes *sweet chocolate*, for without such

treatment the mass has a somewhat bitter taste. The fat extracted from the cocoa is sold under the name of *cocoa butter*, and is used as a basis for creams and pomades for the hair



WHERE RAW COCOA COMES FROM

The above comparisons indicate the amount of cocoa exported to the United States, in average years, from the countries named.

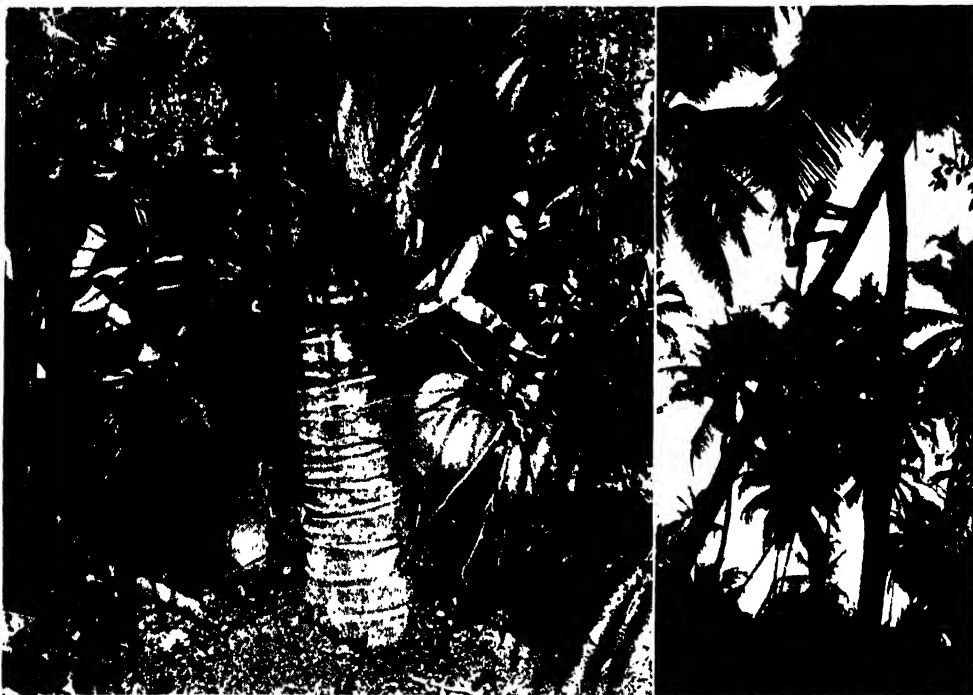
and skin, and in candy-making. The shells of the cocoa beans, usually regarded as a waste product, are sometimes roasted with coffee to add to its flavor, and in some sections peasants use them as a substitute for tea and coffee.

Food Value. The cocoa bean yields a valuable food product, whether in the form of chocolate or of commercial cocoa. When used in moderation, the beverage made from either of these substances is agreeable and nutritious, and superior to both tea and coffee, for the latter are excitants and are without food value. Cocoa and chocolate contain an alkaloid which is an excitant, and most people should not indulge too generously in these beverages. Some people will be made wakeful at night by even a single cup of strong cocoa drunk during the evening. Too free indulgence in chocolate drinks at soda-water fountains, and the excessive eating of chocolate candy will prove harmful, partly because of the effect of the excitant, the bromine, which is similar to caffeine, found in coffee and tea. These alkaloids stimulate the nervous and circulatory systems and the kidneys. See CACAO. B.M.W.

COCOANUT, a variant of coconut (which see).

COCONINO, *ko ko ne' no*, **FOREST**. See ARIZONA (Climate and Vegetation).

COCONUT, OR **COCOANUT**, *ko' ko nut*. This hard, brown-shelled oval fruit of a tropical palm tree is familiar everywhere, either in its natural state or in shredded form, as used in



Photos. Visual Education Service, O R O G

GROWING AND HARVESTING THE CROP

The fruit grows near the ground as well as in the upper branches. The tree at the left was photographed in one of the East Indies. To secure the nuts high among the branches, the natives climb the trees, when a tree slopes, as in the illustration at the right, the lithe-limbed laborer climbs it with ease.

pastries. Boys and girls like to break the thick, hairy shells of the nuts and eat the sweet, white interior and drink its cool "milk," but except in the countries where the coconut is grown, the kernel is used chiefly for pies, puddings, and candies, after it has been chopped into fine pieces, or shredded.

It has long been generally believed that coconuts have spread through tropical lands in some such manner as this: Ages ago, a tall straight palm grew near a tropical ocean. Its naked trunk, sixty to 100 feet high, was topped with a crown of featherlike leaves, among which hung a cluster of a dozen or more nuts. One day possibly a monkey climbed up to look for food and shook down a few ripe nuts, which, falling into the water, floated away and were washed to the shore at spots here and there.

From these nuts sprang new palms, and in time the coasts of India and the islands of the South Seas were covered with the trees. Subsequently, coconut palms were planted in Africa and North and South America—in fact, almost everywhere in tropical countries, principally near the seashore. Florida now produces an abundant supply for winter tourists. More recently, the theory has been advanced by an authority in the United States

Department of Agriculture that the coconut tree originated in the interior of Colombia, South America, and was carried by human means to the lands of the East. At all events, coconuts are now produced for commerce on plantations scientifically managed, and are not known to grow wild naturally.

Anybody who handles one of the nuts will notice three dark spots at one end. From these "eyes," roots and stems are produced when the nuts are germinated. After the seedlings are well grown, they are transplanted to groves in which they are protected and cared for according to the best modern practices. Coconuts flourish in regions of brilliant sunshine and salty air or soil, and they find these requirements in perfection on tropical coasts; plantation owners also profit by cheap and abundant native labor.

To the natives of the countries where the coconut palm grows, the nut is an important article of food. The fruit is eaten ripe or green; the cabbagelike bud at the top of the tree is edible when boiled. Palm wine is made from the sap, which when distilled produces a very strong liquor called *arrack*. The roots, which are narcotic in effect, are chewed by the natives. The coconut oil, or butter, of commerce is pressed from the fruit, to be used in making

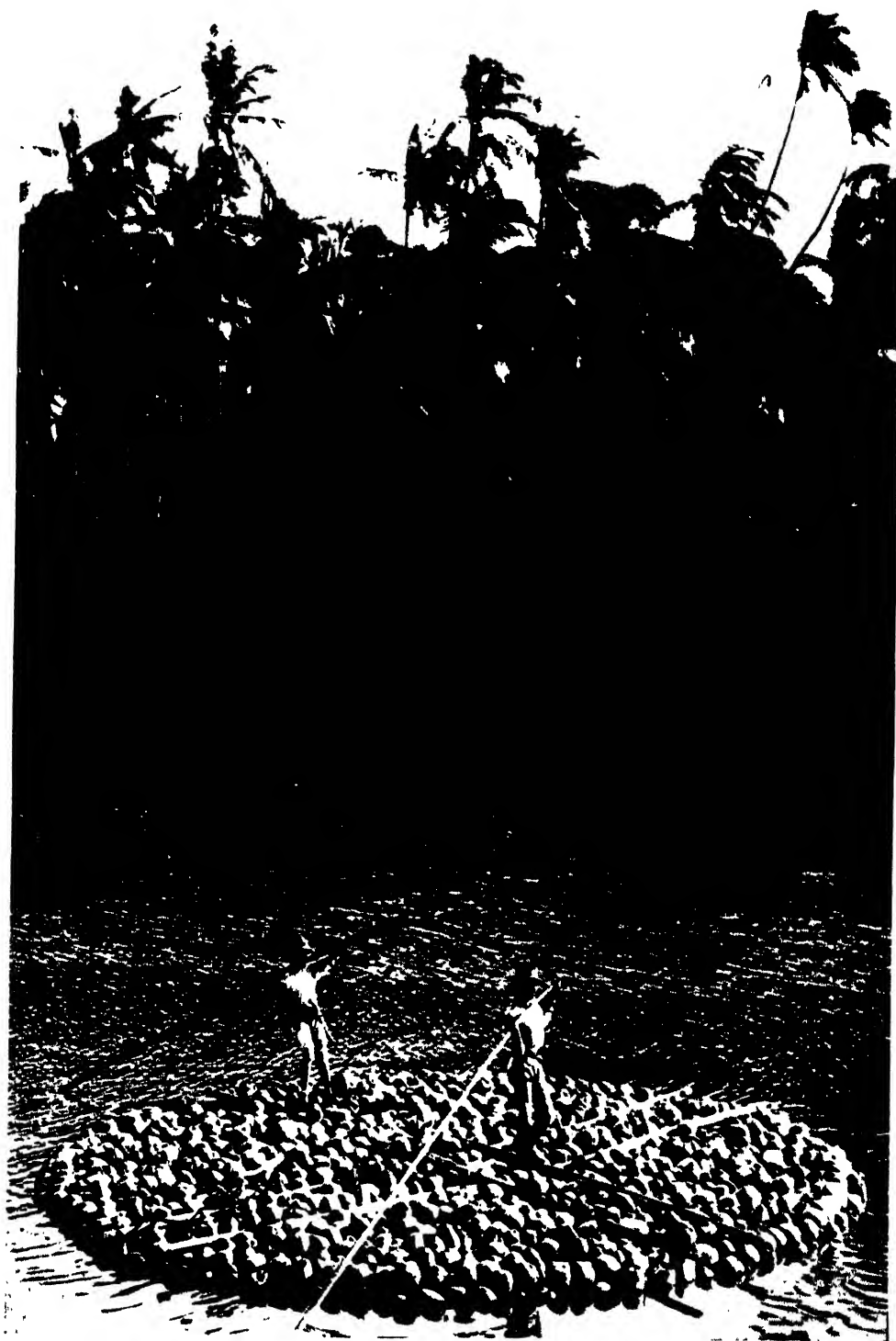
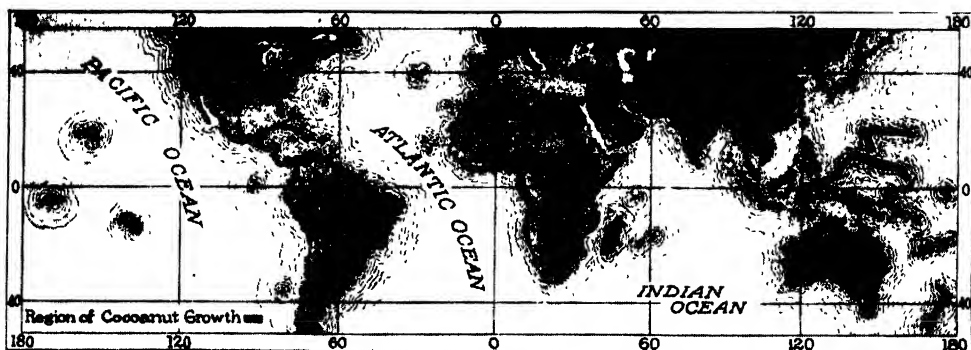


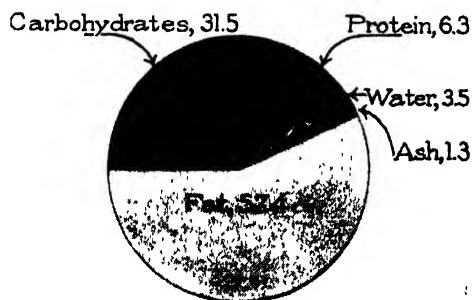
Photo: Keystone

The Raft and the Cargo Are One. Natives of the Philippine Islands are poling their cleverly constructed raft of coconuts down a river from grove to harbor, from where ships will carry the nuts to all parts of the world.



REGIONS FROM WHICH OUR COCONUTS COME

oleomargarine, soap, shampoo preparations, and candles, and for numerous other purposes. The dried kernel is shipped to other countries under the name *copra* (which see). Coconut leaves are utilized for forage and to thatch cottages. From their fibers, cordage, baskets, sacks, and other useful articles are made. The midrib of the leaves is employed by natives for spears, arrows, and torches. Many of the mats on which we wipe our feet are made of coconut fiber, or coir, which is obtained from the husks of varieties raised especially for



COMPOSITION OF THE COCONUT

that purpose. From coconut shells are made useful cups, ladles, and other ornamental utensils. The wood of the lower part of the tree takes a beautiful polish, and is valued for boats and houses. See PALM. B.M.D.

Classification. The botanical name of the coconut palm is *Cocos nucifera*

COCOON, *ko koon'*. Most boys and girls have tried the experiment of imprisoning caterpillars in a box, in order to watch the strange change from worm to fluttering moth or gorgeous butterfly. In many cases they have seen a caterpillar wind about itself a casing formed of thread which it draws out of its head. This casing is the *cocoon*. It is a firm shell, completely covering the insect, which lies quietly in it during the time it is casting off its old skin and preparing for its new life in the air.

During this resting period, between the caterpillar (larval) and adult states, the insect is said to be in the *pupa* stage. Any caterpillar that spins a cocoon is the larva of a moth; the young of butterflies encase themselves in hard skins and becomes *chrysalids*.

The most valuable insect known is an Oriental moth whose caterpillar spins a cocoon from which we get the material for our real silk fabrics.

Though there are undomesticated silkworms in America, and their cocoons may be found hanging hammocklike close to the under side of small branches or carefully concealed within a folded leaf, the cocoon-spinner which children know best is the fuzzy, furry, brown and black caterpillar which curls up when touched. If one of these interesting little creatures is put in a box in the fall, it should be kept in the open air all winter, for its natural process of development is to sleep through the cold weather and build its cocoon in the late spring. When its winter's nap is over, it will wind itself about with threads of silk, weaving its head back and forth until its whole body is hidden in a coarse coat of mingled silk and hair. Strange to say, the completed cocoon is much smaller than the caterpillar before it starts its work. In a few weeks, the end is broken open and the moth crawls out, looking at first like a dilapidated worm, but soon unfolding its patterned wings and showing itself a fully developed insect. Spiders also spin cocoons, but these are used as egg cases. W.J.S.

Related Subjects. The reader is referred in these volumes to the following articles, where numerous illustrations will be found

Caterpillar	Larva	Moth
Chrysalis	Metamorphosis	Pupa

COD, one of the world's most important food fishes, common to both shores of the North Atlantic Ocean, as far south as France and Virginia. It is a near relative of the hake and haddock (both of which see). The cod fisheries along the Grand Banks of Newfoundland and the shores of New England are

famous. The prosperity of Newfoundland, one of Great Britain's oldest colonies, depended for many years solely on cod-fishing, and the flesh of the fish was salted and used in trade like money. The importance of the cod in the early history of the United States is shown in the fact that it had a place on the seal of Massachusetts Colony, and to-day a gilded codfish hangs in the state house of representatives opposite the Speaker's desk, between two central columns. The abundance of the fish along the eastern shores of America was noted by the early voyagers and recorded in the stories of their travels.

Description. The cod has a slightly flattened body which tapers abruptly to the tail, and is usually greenish or olive on the back and sides, which are dotted with numerous small brown spots. The larger fish weigh from twenty to thirty-five pounds; the smaller, about twelve pounds. However, some extraordinary specimens have been caught; the largest ever captured off the New England coast weighed 211½ pounds and was over six feet long, and there are stories of others which weighed from 100 to 175 pounds.

The cod preys on lobsters, shrimps, crabs, and other crustaceans, mollusks, small fishes, and various kinds of seaweed, but is such a greedy eater that it will swallow almost any kind of refuse that comes its way. In the stomachs of captured fish have been found pieces of rubber and leather, scissors and oil cans, glass, stones, and garbage. Along the northern coast of Europe, the cod spawns in February, March, and April; on the American coast, from October to June. Summer and winter are spent in deep water, spring and



Photo Visual Education Service

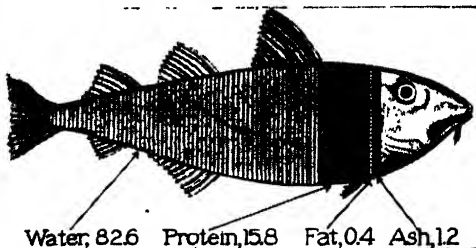
A GREAT FOOD FISH

At the ocean stage of its career.

fall near the shore. These fish produce an astonishing number of eggs. David Starr Jordan estimates that if all the eggs from a seventy-five pound fish during its life should hatch and grow to maturity, the ocean would be filled with an almost solid mass of cod, and that a cod weighing twenty-one pounds will produce 2,700,000 eggs in one spawning period.

The eggs are very small, averaging one-nineteenth of an inch in diameter, and float on top of the water. Hence, they are destroyed or eaten by fishes or birds in countless numbers, and the cod does not multiply as rapidly as might be supposed. In fact, artificial propagation is practiced to maintain the supply.

The Fisheries. The chief cod fisheries of the world are those of Norway and Sweden, Great Britain, France, Canada, Newfoundland,



COMPOSITION OF FRESH COD

and the United States. From 55,000,000 to 65,000,000 pounds are landed annually at the chief Atlantic ports of the United States. American fishermen usually go to the Grand Banks of Newfoundland (ridges in the ocean where the water is only a few hundred feet in depth), and to the George's Bank, off Cape Cod. Nearly all of the ships of the United States cod-fishing fleet hail from Gloucester, Mass., the headquarters of the industry.

The fishermen start out in swift little schooners, which have attached to them several small rowboats, called dories. When the fishing grounds are reached, they set their trawls, which are long lines anchored at both ends and held up by buoys. To these trawls smaller lines with baited hooks are fastened every few yards. A few hours later, some of the men visit the trawls in the dories and remove the cod which have been caught on the hooks; they then carry the catch back to the schooner, and when the vessel has received a load, it returns to port.

Codfish is usually sold salted and dried. Cod-liver oil, obtained from the liver of the fish, is rich in vitamins needed by growing children, and is taken by persons who are ill-nourished and need building up. About 30,000,000 pounds of dried codfish are prepared each year in the United States, but the export trade is for the most part carried on by Norway, Newfoundland, and Canada. The chief markets of the world are France, Spain, Portugal, Italy, and Brazil. See FISH (Deep-Sea Fisheries; Fish Culture). L.H.

Scientific Name. The common codfish is *Gadus callarias*. The Alaska cod of the same genus is *G. macrocephalus*.

CODE NAPOLEON, the French civil code of laws compiled under the direction of Napoleon Bonaparte, and largely a reenactment of the Justinian Code, or systematized body of Roman law. Properly, it is the entire body of French law as contained in the Five Codes promulgated between 1804 and 1810. The term is

especially applied to the first of these codes, established by Napoleon as a result of the labors, under his direction, of eminent French jurists. The great merit of the code is its simplicity, but in spite of this, it has aroused controversies, and there has been considerable legislative amendment. To Canadians and Americans, interest in the Napoleonic code lies in the fact that it is the foundation of the codes of the state of Louisiana and of the province of Quebec, which were French in their early periods. All the other states in the American Union and the provinces of the Dominion of Canada base their laws upon the Roman code. See CIVIL LAW; JUSTINIAN; LOUISIANA (Government).

CODE WRITING, a method of writing a message so that none but those possessed of the key may decipher its meaning. It is of ancient origin, and its study has been one of great interest in all ages. Ingenuity is required to conceal the meaning of a written message, but it has been said that, no matter how ingenious a code or cipher may be, someone will be found with sufficient cleverness to decipher it. Julius Caesar used one of the simplest forms of code by employing the third letter of the alphabet ahead of the one he wished to indicate. Thus, instead of writing *a* he would write *d*, instead of *m* he would write *p*, and so on. In using the word *man*, for instance, he would write it *pdq*. References to code writing only to be understood by the initiated appear frequently in the Bible. Jeremiah, referring to Babylon, wrote the word *sheshak*; instead of using the second and twelfth letters from the beginning of the Hebrew alphabet, he wrote the second and twelfth from the end.

Charles I constantly employed a code in writing to his adherents, and numbers of his letters fell into the hands of his enemies at the Battle of Naseby. At the present time, codes are largely used in diplomatic circles and in business, when it is desired to keep transactions secret or to make one word stand for several, in order to save expense in telegraphing or cabling. The great telegraph companies have compiled codes, and copies of these in book form are placed at the disposal of anyone using their service.

CODICIL, *kahd' i sil*. See WILL.

CODLING MOTH, a small gray-brown moth whose



TWO OF THE MOTHS

larva is the most common cause of wormy apples. It is estimated that this pest causes the apple-growers of America a loss of about

\$20,000,000 a year. The mother moths deposit their eggs on the leaves of apple trees about three weeks after the blossoms appear. The young, as soon as they are hatched, may feed on the leaves, or may eat their way into the fruit, beginning usually at the blossom end.



LARVA OF CODLING MOTH

After feeding on the cores, the worms leave the apples and find a sheltered place to spin their cocoons. The moths appear a few weeks later, and a second brood of grubs attacks the



HOW THE APPLE IS DESTROYED

apples in midsummer. These larvae feed on the fruit until they are mature, and then go into cocoons for the winter.

The best measure against the codling moth is a thorough spraying with arsenate of lead and lime sulphur, just after the blossoms have fallen, and again about three weeks later. Another spraying, ten weeks after the first, will catch the second brood of worms. Fallen apples should also be destroyed, to kill the larvae, and the orchard should be kept clear of rubbish which may hold cocoons. W.J.S.

Classification. The codling moth belongs to the family *Tortricidae*. Its scientific name is *Carpocapsa pomonella*.

COD-LIVER OIL, a thin, pale-yellow oil obtained from clean, fresh cod livers by a steam process. Cod-liver oil is highly regarded by physicians as a nutrient in wasting diseases,

such as rickets, pulmonary consumption, and scrofula. Not only is it nutritious, but it is easily digested and assimilated. Especially is it a valuable food for young children; infants who cannot be breast-fed are given cod-liver oil to ward off colds as well as rickets. Vitamin A (see VITAMINS), the element that makes the oil so valuable for babies, can be imparted to the milk of cows if the animals are given two ounces of the oil a day. They need to have it in winter, when fresh grass is not available. Cod-liver oil is distasteful to some persons, and is considered more palatable when taken in the form of an emulsion. It may also be purchased in the form of gelatin capsules. See COD.

W.A.E.

CODRUS, *kod' rus*, in the legends of ancient Greece, the last king of Athens. When the Dorians invaded Attica, Codrus was told by an oracle that his country would be saved if the Athenian king were struck down by the hand of the enemy. He therefore entered the Dorian camp disguised as a peasant, and, provoking a quarrel, was slain. The enemy then withdrew, and the grateful Athenians, esteeming no one worthy to succeed their king who had sacrificed himself for them, gave to the son of Codrus the title of *archon* and abolished the royal office. See ARCHON.

CODY, *ko' die*, WILLIAM FREDERICK (1846-1917), the BUFFALO BILL of the great plains in the pioneer days of the West in the United States, and organizer in his later years of the "Wild West Show," with which he toured America, and Europe. With its bands of Indians, cowboys, rough riders, "bucking bronchos," "Deadwood Coach," and buffaloes, the famous exhibition portrayed much of the actual early life on the plains. Cody was born in

Scott County, Iowa. As an express rider during his early life on the Western frontier, he gained a reputation as a keen, fearless rider and

plainsman. During the War of Secession, he rendered valuable services as a Union scout, and he was the last of the six great scouts of America, the others being Boone, Carson, Crockett, Bridger, and "Wild Bill." The name *Buffalo Bill* was given Cody during the construction of the Union Pacific Railroad, for he contracted to supply fresh buffalo meat to the troops and laborers there, and killed over 4,000 buffalo in eighteen months.

COE COLLEGE, a school in Cedar Rapids, Ia. See CEDAR RAPIDS.

COECUM, *se' kum*. See APPENDICITIS.

COEDUCATION, *ko ed u ka' shun*. Public schools were first established for boys only, and the education of girls under public auspices was given little or no attention. When society awakened to the realization of the necessity for educating girls, there were no schools for them, so both boys and girls attended the same elementary schools. Later, in Germany, France, and England, separate schools were established for the sexes.

Necessity compelled the early colonists in America to send boys and girls to the same elementary schools, and the system of coeducation early established has continued to the present time, although in some sections of the country, notably in certain Southern states, the high schools are not coeducational. Over one-half of the private institutions are coeducational. The arguments of those opposed to coeducation embrace the following theories:

(1) During the adolescent period, coeducation prevents the development of certain of the finest feminine qualities in the girl and certain masculine qualities in



Photos, Keystone, Visual Education Service

A NATIONAL CHARACTER HONORED

The equestrian statue of "Buffalo Bill" is in Central Park, New York City. His grave, on Mount Lookout, near Denver, Colo. [See portrait, page 1526.]

sumes that the orbit of an electron is a series of different positions, not a continuous line, and that the radiation of energy is a discontinuous process. Professor R. A. Millikan has stated that the spectroscope is furnishing "as exacting proof of the orbital theory of electronic motions as the telescope furnished a century earlier for the orbital theory of the motions of heavenly bodies."

Chemical Compounds

If a small quantity of very fine iron filings be mixed thoroughly with a small quantity of powdered sulphur, the iron remains iron and the sulphur remains sulphur. They may be distinguished from each other when looked at through a microscope, and a magnet held over the mixture will quickly draw out the iron, leaving the sulphur. But if the mixture is placed in an iron spoon (or a glass test tube) and held over a hot flame, something is formed which is neither iron nor sulphur—which is not like either iron or sulphur. The new substance may be pounded to a powder, but no magnet, however strong, can now draw out the iron, for the simple reason that, as iron, it is not there. The new substance is just as real and has just as distinct properties of its own as had the two elements which combined to make it, but there is one difference. Any person who knows the proper chemical means for decomposing the new substance could reduce it again to iron and sulphur, while no ordinary chemical process could have divided either of the original elements.

The iron and sulphur before they were heated formed what is known as a *mechanical mixture*, each keeping its own properties; after they were heated they formed a *chemical compound*. Many of the very commonest things, which seem as simple as anything could well be, are really chemical compounds. Water and salt, for example, are of this nature. Air, on the other hand, is a mere mechanical mixture of gases.

There are definite ways in which chemical compounds are made up. When a certain number of atoms of one element are brought close to atoms of another element, various things may happen. They may remain exactly as they have been, neither substance showing the slightest interest in the other; one atom of one kind may seize upon one or more atoms of the other kind and unite with them to form a tiny particle of a new substance—a *chemical compound*; or both kinds of atoms may wait until some force, as heat or electricity, puts them in such a condition that they can unite.

Atoms which will thus unite with each other, either with or without aid, are said to have a *chemical affinity* for each other, and unless two substances have such affinity they cannot be forced to unite. No amount of mixing or melt-

ing or heating will make of them anything but a mechanical mixture. In the experiment described above, the sulphur and iron filings united to form a new substance with properties of its own, not just because they were melted together, but because they also have a chemical affinity for each other.

In the very simplest form of a chemical compound, one atom of one substance unites with one atom of another. But often one atom of one element will seize upon two or three or even four of another, or two atoms of one may combine with three of another. It is easier for some elements to enter into combination than for others, because some elements are gases and some are solids, and the latter are much more dependent on outside forces to make it possible for them to unite with substances for which they have even the strongest chemical affinity.

From the standpoint of the new chemistry, chemical combination is explained in terms of electronic activity. Briefly, such power of combination is believed to be the ability of the atom to attract one or more electrons from another atom, or to yield electrons to such an atom. The movements of electrons outside the nucleus are supposed to effect chemical changes; more particularly, those in the outer orbits, which chemists call *valence electrons*. The theory is that the external electrons are arranged in so-called *spheres*, or *shells*, and that the valence electrons are in the outermost shell. The inert elements, those that do not enter into chemical combination, have no valence electrons. As the atomic numbers of the elements in the periodic table increase by unity, the number of valence electrons held in the outside shell increases from 0 to 7. For example, starting with helium (no valence electron) we have the following series: helium (0), lithium (1), glucinum (2), boron (3), carbon (4), nitrogen (5), oxygen (6), fluorine (7). Following fluorine in the table is neon, another inert element (with no valence electron). It begins another series with valence electrons increasing by 1 until chlorine is reached, with 7 valence electrons. The recurrence of properties at regular intervals is thus explained.

Chemical activity depends upon the valence electrons. The nucleus and remaining external electrons are said to form the *kernel* of the atom, and are thought to be beyond the reach of reagents. Chemical combination differs from transmutation in that transmutation involves a breaking up of nuclei. So long as the nucleus remains intact, an atom which has undergone chemical combination may be reconstituted.

Chemical Symbols. It is customary to assign to each element a symbol representing an abbreviation of its common or Latin name. Examples are *O* for oxygen, *N* for nitrogen, *Li*

CINCINNATI

bridges, and transit facilities is under the supervision of a city-planning commission. Of the seventy-seven parks, Eden Park, on the east side, near the Ohio River, is one of the finest. The Art Museum and Art Academy are located within its grounds, and adjoining it, on Mount Adams, is the Rookwood Pottery establishment. The park contains two beautiful reservoirs and a tall water tower which affords delightful views of the country roundabout. Much admired, too, is its medieval entrance, Elsinore Gateway. Burnet Woods Park, in the Highland section to the north, includes the grounds of the University of Cincinnati. In Lytle Park, a chief point of interest is a statue of Lincoln by Barnard, the gift of Mr. and Mrs. Charles P. Taft. A conspicuous structure in the heart of the city is the Tyler-Davidson Fountain, on Fountain Square, between Vine and Walnut streets.

The Central Parkway has been opened from the heart of Cincinnati to Ludlow Avenue, and is one of the most outstanding accomplishments for the promotion of the city for many years. It was completed and turned over to the city government and the people by the Board of Rapid Transit Commissioners in 1928. It cost \$4,250,000.

Other parks and recreation centers include Ault, Lincoln, Washington, Mount Storm, Alma, and Mount Echo parks, the Mount Airy Forest project (1,132 acres), the Zoölogical Garden, with one of the largest collections of wild-animal life in America, and scores of playgrounds and athletic fields. The Cincinnati "Reds" have a fine baseball park in the city.

Institutions. Cincinnati is recognized as a leading educational center. Its municipally owned university is famous (see subhead, below). Among other important institutions of higher learning are Saint Xavier College, Lane Theological Seminary, Ohio Mechanics Institute, Hebrew Union College (the principal one in the United States for the education of rabbis), and two conservatories of music of national repute. The Symphony Orchestra is also nationally famous. Among the benevolent institutions are the General and Children's hospitals. The former is one of the largest municipal hospitals in America, having twenty-four buildings on a tract of sixty-five acres.

Transportation. Because of its various trunk lines leading southward, Cincinnati is called "the gateway to the South." The principal lines connecting with the Southern states east of the Mississippi are the Southern Railway, the Louisville & Nashville, and the Illinois Central. Other trunk lines radiating from the city include the Chesapeake & Ohio, the Norfolk & Western, the Baltimore & Ohio, the Pennsylvania, the Erie, and the Big Four. The municipally owned Cincinnati Southern Railway, extending from Cincinnati to Chatta-

CINCINNATI

nooga, a distance of 338 miles, is leased by the Southern Railway. The city also has numerous interurban and motorbus lines. The Ohio River is used for heavy freight like coal, lumber, and iron, and packet service is maintained between Cincinnati and Louisville and other river points. The great movable Fern Bank Dam, twelve miles down the Ohio, facilitates commerce. Near the city are the Lunken and Watson airports; Cincinnati is a station in the air-mail service.

The new Union Station will be located in the western part of the city. It will not only include a passenger terminal, but freight and transfer terminals, as well. The total cost will be not far from \$75,000,000.

Commerce and Industry. The immediate trading area of the city extends north and east for thirty miles, westward over a fifty-mile radius, and southward for ninety miles. Within a radius of 800 miles are over three-fourths of the country's inhabitants. Profiting by its facilities for receiving and shipping raw materials and manufactured goods, and its strategic position with respect to markets, Cincinnati has enjoyed long-continued industrial prosperity. Over 3,000 industrial plants in the city and suburbs produce goods having an annual value of nearly a billion dollars. According to the United States census of manufactures, Cincinnati proper ranks fifteenth among all American cities in value of products, and of 333 major types of industry listed in the census report, it is represented by about one-third. The most important products include soap, machinery and other metal products, clothing, shoes, radio sets, synthetic plastics, engineering specialties, furniture, playing cards, and printing inks. Printing and publishing, including music publishing, is also well represented, and the exquisite Rookwood pottery produced at Mount Adams is nationally famous.

The city was once important as a center for the manufacture of iron and its various products. This industry has languished, but manufacturers of many articles of iron and steel consume iron that is manufactured elsewhere. Slaughtering and meat-packing is now less important than formerly.

The city is a leading soft-coal center, handling over 650,000 carloads annually, and is also an important lumber market. It ranks, too, among the first five American centers recognized by foreign buyers. It is a prominent banking and insurance center; the Union Central Life Insurance Company has erected here a building thirty-four stories high, one of the tallest buildings west of New York.

The Lunken airport, in the eastern part of the city, comprises 700 acres, has a 3,800-foot runway, and is only five miles from the city postoffice. Watson airport, formerly Grisard, at Blue Ash, comprises 100 acres.

After leaving the pulping machines, the beans are run through a series of fermenting and washing tanks, to remove the saccharine matter adhering to the parchment, and are then put through the drying process, either by exposure to the sun or by artificial heat. Before the parchment covering is removed, the beans are left to cure for several weeks. This process improves the quality and aids in retaining better color.

The next step is hulling and peeling. This consists in the removal, generally by milling, of both the parchment and the silver skin. As the beans emerge from the huller, a fan removes the detached skins, and the beans then go to the separator. Sand and dust drop through the first section; small and broken beans through the next, and so on until only the best and largest beans remain. Then follows a careful hand-sorting of the better grades, to eliminate any discolored or otherwise un-

a third of all that is raised. The government estimates that the average American drinks ten and one-half pounds each year. In Canada, where tea is the favorite breakfast beverage, the individual allowance slightly exceeds two pounds. Below are approximately correct figures for the number of pounds consumed

by each coffee-drinker in some of the other nations:

Netherlands	15
Sweden	12½
Denmark	12
Norway	11
Belgium	10
Finland	9½
Cuba	9

Description of Varieties. *Mocha* coffee is a small, grayish-green bean. The name was taken from an Arabian port of that name, which exported at one time the finest coffee in the world, but names no longer signify the places from which the coffees come. Until the beginning of the eighteenth century, Mocha furnished practically all the world's supply. *Java*, or *East Indian*, coffee is a large, yellow bean.



Photo Keystone

A SOCIAL HOUR IN PALESTINE

Here is pictured a custom similar to the ceremonial tea in Japan. The neighborly group is probably engaged in harmless gossip over the small coffee cups which the natives of Palestine have long used

practically all the world's supply. *Java*, or *East Indian*, coffee is a large, yellow bean.

COFFERDAM, *kof' er dam*, a temporary enclosure erected in water, usually formed of two or more rows of piles driven close together, with the spaces between packed with clay, making the interior water-tight. When the enclosure is complete, the water is pumped out. There is then a dry foundation on which piers or other superstructures can be erected. The most remarkable use of cofferdams in recent times occurred when the sunken battleship *Maine*, in Havana harbor, was raised in 1912 for examination. The vessel was surrounded by a huge cofferdam, the water was pumped out, and when the damage to the vessel had been ascertained, the water was allowed to flow back into the cofferdam, which was then removed.

COFFEYVILLE, KAN. See KANSAS (back of map).

COFFIN, a burial case, usually a box or chest, in which the dead are placed, commonly called a casket. Coffins at the present time are most generally made of wood, though metal, stone, glass, and terra cotta are sometimes employed. The outside is ordinarily covered with cloth or velvet, white being used for young persons, and black and various shades of gray for the more aged. A modern method is to enclose a coffin in a shell of cement.

The Greeks made their coffins of burnt clay; sometimes this was first molded around the body and then baked. Urn-shaped and triangular coffins, the body being placed in the latter in a sitting position, were also common. The Romans at first burned the bodies of their dead, but at the beginning of the Christian Era stone coffins were introduced. Many examples of these, dating from the Roman period, have been excavated in England. Among the wealthy Romans, limestone coffins were in favor. As this stone was supposed to consume the body, the name sarcophagus was applied to limestone coffins, for the word *sarcophagus* means, in Greek, *flesh-eating*.

A wooden coffin made of a tree trunk, cut through the center and hollowed out, formed the burial case of primitive man. This variety was used in England in the Middle Ages by those who could not afford stone coffins, while the poorest people were buried with only a cloth for a covering. References in English fiction show that in later times wooden coffins, of which the more elaborate present-day designs were a natural development, were in common use.

Literary References. George Eliot's carpenter-hero of her novel *Adam Bede* made his own father's coffin, and in the masterpiece of Dickens, when little David Copperfield was on his way from school to attend his mother's funeral and stopped at a shop in Yarmouth to be measured for his mourning, he heard in an adjoining room the *tap, tap* of the workman who was making the coffin for his mother.

Related Subjects. The reader is referred in these volumes to the following articles:

Burial Cremation Sarcophagus

COGNAC, a wine, first made in France.

COHAN, GEORGE MICHAEL (1878-), an actor and playwright who wrote as many successful comedies as have been credited to any American author. At the age of nine, he became an actor, and while yet a boy appeared in vaudeville for several successive years with his father, mother, and sister, as one of "The Four Cohans." Even after he had attained fame and wealth, he frequently acted.

What He Wrote. While many of Cohan's plays were light and trifling, a few were of a high order of comedy; two of these most worthy of notice by critics were *Forty-five Minutes from Broadway* and *Seven Keys to Baldpate*. In the latter, he reached his highest standard of excellence. Other plays were *Little Johnny Jones*, *George Washington, Jr.*, *The Yankee Prince*, *Broadway Jones*, *The Song and Dance Man*, *Hit the Trail Holiday*, and *The Rise of Rosie O'Reilly*.

COHEN, OCTAVUS ROY (1891-), an American short-story writer, best known for his humorous negro-dialect stories. He was born in Charleston, S. C., and educated at Porter Military Academy in his native city and at Clemson College. After working for a short time as a lawyer, and later as a civil engineer, he turned to light fiction for a career, but feeling that an apprenticeship as a reporter would give him the breadth of experience essential to greatest success, he joined the staffs of daily papers in Charleston, and Newark, N. J. After 1915 he gave his time entirely to independent literary activity, and became very soon one of the highest-paid writers of short stories in America. His greatest fame was achieved as a delineator of negro life, his home is in Birmingham, Ala., which is the scene of the stories in which his dusky characters appear.



Photo U & U

OCTAVUS ROY COHEN

COHESION, *ko he' zhun*, in physics, is one of the properties of matter, the force which makes particles of the same substance stick together. Solids have the greatest amount of cohesion, liquids have much less, and gaseous substances none at all. If it were not for the force of cohesion, the particles composing brick, stone, iron, or any other substance would not hold together, and all the buildings of a city would crumble to ruin if this force should suddenly become ineffective. For example, the different parts of a solid iron wheel are held together by this force. When the wheel is

rotated it is cohesion which prevents it from flying to pieces. As the speed of rotation is increased, the centrifugal force increases rapidly, and at high speeds may exceed the cohesive force which holds the parts of the wheel together. Each part then moves off in a straight line instead of in a curved path, and the wheel flies to pieces. Proof that liquids have this property to but slight degree is seen in the case of water, which assumes the shape of any container into which it is poured. Gases, if relieved of pressure, tend to scatter; the particles become divided and are dissipated into the air. Cohesion differs from adhesion in that it applies to particles of the same kind, while adhesion is the force that holds together unlike particles, as mud to a tire. A.L.F.

Related Subjects. The reader is referred in these volumes to the following articles

Adhesion	Capillarity	Molecule
Attraction	Matter	Physics

COHO, *ko' ho*, a species of salmon (which see).

COHOES, *N. Y.* See **NEW YORK** (back of map).

COHORT, *ko' hawrt.* See **PRAETORIAN GUARD**.

COHOSH, *ko' hosh* See **SNAKEROOT**.

COINAGE. See **MONEY**.

COINS, **FOREIGN**. See **MONEY** (Foreign Monetary Standards).

COIR, coconut fiber used for mats, rope, etc. See **COCONUT**.

COIT, **STANTON**. See **SOCIAL SETTLEMENT**.

COKE, *kohk*. Bituminous, or soft, coal, when burned with a limited supply of air in kilns, called ovens, produces a variety of charcoal called *coke*. The best ovens are long and narrow and are heated by gas. As fast as the charge is coked, it is pushed out through doors at the bottom and a new charge is put in at the top. Coal tar, ammonia, and gas are obtained as by-products in the manufacture of coke. Some of this gas is used in heating the coke ovens, and the remainder is sold for heating and lighting purposes.

Good coke has a blackish-gray color, is hard, brittle, and porous. It burns without flame or smoke, and produces intense heat. It is used in smelting iron ore, because it is free from sulphur and other substances that injure the iron. It is also used in melting metals for casting and to an increasing extent in furnaces for warming houses. Coke is manufactured extensively in England, and in Western Pennsylvania, West Virginia, and Tennessee in the United States, and to a limited extent in British Columbia. Pennsylvania leads all other sections of the American continent in production. Not all bituminous coal makes good coke, and coke ovens are located only in those regions that have good coking coal. See **COAL** (Bituminous Coal); **CHARCOAL**.

COLBAITH, **JEREMIAH JONES**, the real name of one of the Vice-Presidents of the United States. See **WILSON**, **HENRY**.

COLBY COLLEGE. See **MAINE** (Education).

COLCHICINE, *kol' ki sin.* See **COLCHICUM**.

COLCHICUM, *kol' ki kum.* the poisonous meadow saffron, a plant of the lily family, valued because of the medicinal properties of its seeds and root, or corm. From these is obtained a poisonous, bitter alkaloid, called *colchicine*, used in preparations for the relief of gout. The meadow saffron grows wild in the moist meadow lands of England and Ireland, Middle and Southern Europe, and in the Swiss Alps. Its pale-purple flowers, which bloom in the autumn, are much like those of the crocus, and it is called *autumn crocus* by florists. As it is one of the most beautiful of the autumn-flowering plants, colchicum is often found in gardens. It is easily cultivated if planted in a light, sandy loam, where there is plenty of moisture. B.M.D.

Scientific Name. The species described above belongs to the family *Liliaceae*. Its botanical name is *Colchicum autumnale*.

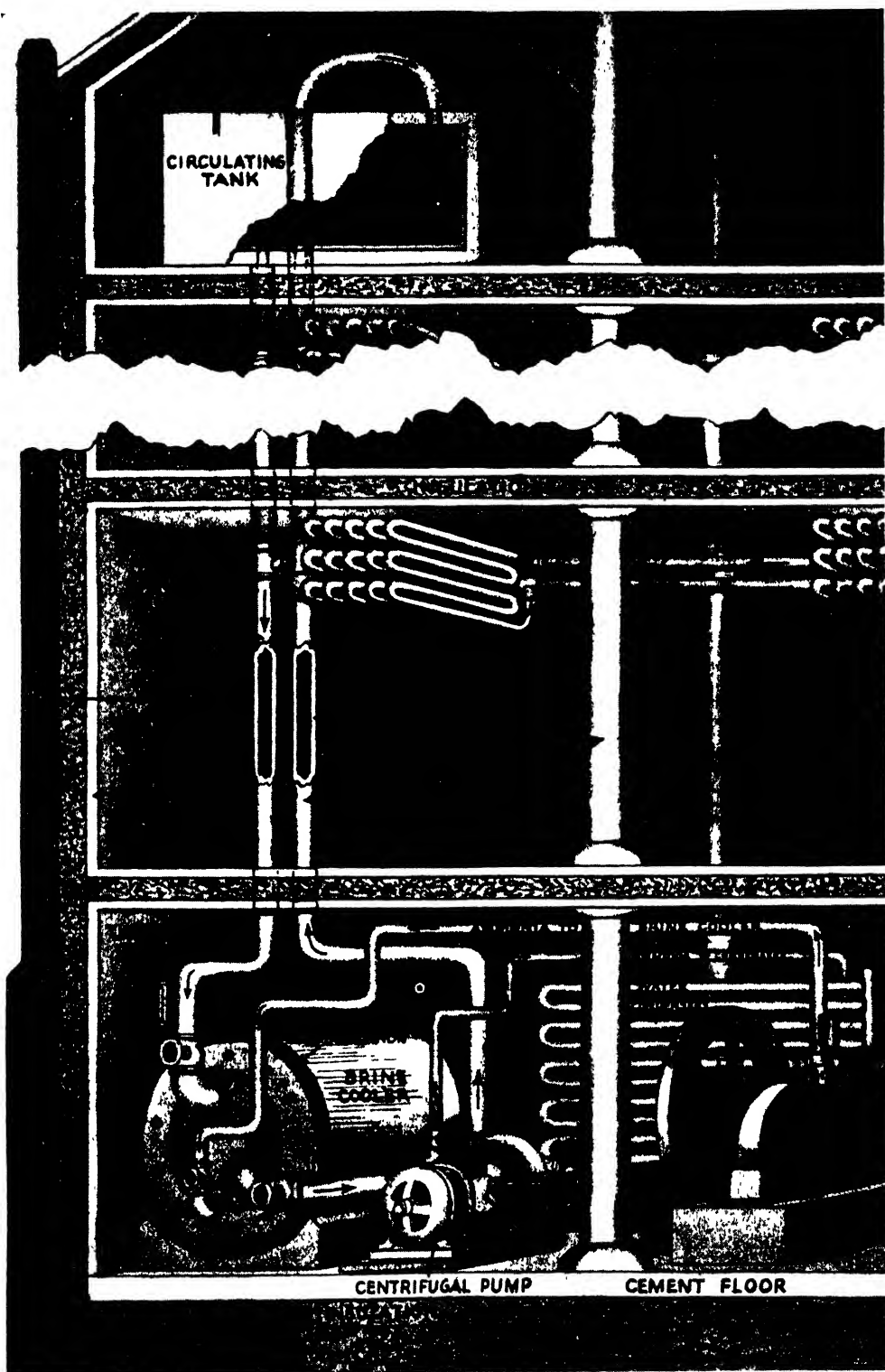
COLCHIS, *kol' kis*, father of Medea (which see). See, also, **ARGONAUTS**.

COLD, an ailment. See **CORYZA**.

COLD FRAME. See **HOTBED**.

COLD STORAGE, the method employed to preserve perishable articles by keeping them at a low temperature, constantly maintained, and a fixed humidity. What the housewife does on a small scale with her refrigerator, the operators of cold-storage plants do on a large scale (see **REFRIGERATION**). Sometimes as many as a hundred million cases of eggs (3,600 million dozen eggs) are in storage warehouses at one time. Nearly all fruits, vegetables, meats, milk, butter, and eggs placed on the market in large cities come from such warehouses. Every local meat market, hotel, grocery, and modern apartment house has its cold-storage room, in which are kept all articles of food that would perish at ordinary temperatures. Refrigerator cars transport fruit, milk, butter, and meat long distances, and deliver them in a condition of perfect preservation. Refrigerator ships, equipped with cold-storage systems, carry food from one country to another.

All of this results in a tremendous economic advantage. Fruits, eggs, and other perishable articles of food can be purchased in large quantities and preserved until needed. Fresh meat may be preserved until it becomes tender. In this way, shiploads of fruit are saved from decay, because the apple, peach, orange, and grape crops cannot be properly cared for as they ripen. Eggs can be purchased during the spring



and summer and stored for winter, when the production is small. Without the system of cold storage to supply the population of large cities with these articles, the food question would become a very serious problem, and the cost of many foods would be prohibitive more than a short distance from the place of production. By means of cold storage, the process of meat slaughtering and packing may be consolidated; this is a great advantage to the public, because it makes possible government inspection, with resulting attention to sanitation, and gives better facilities for the safe preservation of meats.

The Cold-Storage Plant. The necessary parts of a cold-storage plant are the machinery for cooling the air and storage rooms for the articles to be preserved. Practically all large plants use the method of evaporating a volatile liquid (one that evaporates readily) for reducing the temperature. Ammonia, sulphuric ether, sulphurous acid, and carbonic acid are all suitable for the purpose, but ammonia (which see), because of its cheapness and the low temperature at which it changes to a gas, is used much more extensively than all the others. The ammonia used is a liquid, formed by condensing ammonia gas, which is easily converted into a liquid at 32° above zero F. or 0° Centigrade (the freezing point), under a pressure of about sixty-one pounds to the square inch. This liquid contains no water, and is generally known as *anhydrous ammonia*.

The refrigerating apparatus consists of a force pump for condensing the ammonia gas to a liquid; a tank for holding the liquid ammonia; coils of pipe or an expansion chamber, in which the ammonia changes to a gas; and pipes for returning this gas to the pump, to be again condensed to a liquid. In its change to gas, the ammonia rapidly reduces the temperature of surrounding objects.

In large plants, the evaporation takes place in a closed chamber containing coils of pipe filled with strong brine, which freezes at a much lower temperature than does water. The cold brine is conducted through pipes to all parts of the storage room, and in this way an even temperature is maintained. After completing the circuit of the pipes, the brine returns to the refrigerating coils and is used over and over again.

The storage rooms usually have double walls, with an air space between to protect them from the temperature of the outside air. The ceiling is low, seldom exceeding eight or nine feet, and the pipes are so distributed as to maintain a uniform temperature in all parts of the room. There must be enough ventilation to keep the air pure and to provide free circulation about the stored articles, but too much interferes with the temperature. Ozone, used extensively as a purifier of water, is also used in

large cold-storage plants for purification of air and the arresting of mold growths.

The plants are in charge of workmen who thoroughly understand the system, and they maintain any temperature desired. Rooms for preserving beef, mutton, and pork for a short time are kept at just below the freezing point; for long storage, 20° colder. Those for the preservation of poultry and fish must be several degrees below freezing, because these articles must be kept frozen. Eggs and fruits require a temperature of about 36° F., but it is claimed that butter retains its flavor better if kept at a temperature below the freezing point. Milk, however, should not be frozen. The rooms in which butter, eggs, and milk are stored must be scrupulously clean, and the air free from odors, or these articles may become tainted and unfit for use.

Cold-Storage Temperatures. Many people do not know at what temperatures different articles should be kept to preserve them in best condition. The following table is approved by authorities, the figures being Fahrenheit degrees of temperature:

Apples (long storage)	31-34
Apples (short storage)	40-45
Bacon and hams	40-45
Butter (long storage)	10
Butter (short storage)	20-25
Cheese (strictly cool cured)	60
Cheese (ordinary cured)	35-40
Eggs	29
Fish (frozen)	15-18
Fruit	30
Furs and woolens	30-40
Grapes	35-38
Meats and dressed poultry (10 to 20 days)	30
Meats and dressed poultry (long storage)	10-15
Pears	33-36
Peaches	34-40
Potatoes	36

Disadvantages. While cold storage has become a necessity, it is not without its disadvantages. Because of high cost of construction and maintenance, it is natural that small capital cannot compete successfully in these enterprises; large and powerful companies control most of the business, and this fact has given rise to charges that combinations exist to control prices, by holding produce from the market until times of scarcity; however, strict official investigation has not developed facts which give warrant for such suspicions. It is true that vast quantities of produce are kept in storage for many months.

Again, articles, especially eggs, may be held in storage so long that they lose much of their good qualities, and may even become unwholesome. The third disadvantage is that these large combinations drive small dealers out of the market.

Special Uses of Cold Air. Cold air is used for protecting furs from insects during the

summer; for preserving bulbs, ferns, and flowers; for cooling hotels, hospitals, theaters, and other public buildings; and to harden chocolate candy before it is placed on the market. In cities, there are firms which engage to furnish cold air for cooling buildings, running it through pipes, the same as gas, and they find many customers. See REFRIGERATION. E.V.M'C.

COLEMAN, ARTHUR PHILEMON (1852-), a Canadian geologist, equally distinguished as an investigator and a teacher. He was born at Lachute, Que., but in boyhood removed to Ontario, where he attended the Cobourg Collegiate Institute and Victoria University. After graduation from the latter in 1876, he pursued his study of the natural sciences at the University of Breslau, Germany, and upon his return to Canada was professor of geology at Victoria University until 1890. For several years he taught metallurgy and assaying at the School of Practical Science, Toronto, and was also geologist to the Ontario Bureau of Mines. In 1895 he became professor of geology at the University of Toronto. Professor Coleman explored and mapped several sections of the Rocky Mountains and also made a geological survey of the Sudbury district in Ontario. His reports on the geology and mineral resources of Ontario are authoritative.

COLEOPTERA, *kohl e op' tur ah*. See BEE-
TLE; INSECT (Classification).

COLERIDGE, kohl' rij, **SAMUEL TAYLOR** (1772-1834). In his youth, this English poet showed both the brilliance and the impulsiveness which characterized his whole life. During his second year as a student at Cambridge, he became discouraged with his progress and decided to give up all attempts at academic success. He went secretly to London and enlisted in the Fifteenth Dragoons, under the name Silas Tomkyn Comerback; this was evidently chosen to retain his initials S. T. C., which later became so famous. When his friends learned what he had done, they obtained his discharge and induced him to return to college.

Coleridge was the tenth child of a poor clergyman of Ottery Saint Mary, and at the age of ten was placed as a charity pupil in the famous Christ's Hospital, London, where he had Charles Lamb for a schoolmate. Coleridge remained at this school for eight years, and in 1791 entered Cambridge University, but was unable to finish his course. A visit to Southey, in 1794, was notable from the fact that the two young men, enthusiastic believers in the principles of the French Revolution, planned to found, on the banks of the Susquehanna River in America, an ideal brotherly community. Lack of capital put an end to this dream.

In 1795 Coleridge married the sister of Southey's wife, and settled near Wordsworth's home, at Nether Stowey. The result of their

companionship was the publication, in 1798, of *The Lyrical Ballads*, the remarkable volume of poems that marks the beginning of the Romantic Period of English literature. To this Coleridge contributed that masterpiece of modern ballad writing, *The Rime of the Ancient Mariner*. During the same year, he traveled in Germany with Wordsworth, where he became an eager student of the philosophy of Immanuel Kant.

On his return to England, he settled in Keswick, in the beautiful Lake country, to be near Wordsworth and Southey, and at this time did some of his best writing. It was during this

period, also, that he began to suffer from rheumatic pains that brought him into the grip of the terrible opium habit. Unable to fight the battle alone, he lived from 1816 until his death in the home of a London friend, leaving his family to the care of Southey. His great



Photos. Brown Bros.; Frith

SAMUEL TAYLOR COLERIDGE

The poet and the cottage in which he lived.

book of literary criticism, *Biographia Literaria*, appeared in 1817, but his creative powers were so weakened that in his later years he produced little that was noteworthy. His personal charm and extraordinary gifts in conversation, however, made Coleridge to the end a notable figure in his own circle. He influenced the poetry of Byron, Shelley, and Keats.

Splendor of imagination and a sense of melody characterize his poetry. His ability as a literary critic was hardly less remarkable, and he is honored as the father of modern Shakespearean study. Furthermore, he exerted a tremendous influence on nineteenth-century thought by his introduction into England of German literature and philosophy.

[Coleridge's most famous poems are *The Ancient Mariner*, *Christabel*, and *Kubla Khan*. See ANCIENT MARINER, THE]

COLERIDGE-TAYLOR, *kohl' rij ta' lur*, SAMUEL (1875-1912), an English musical composer whose best-known work is a composition for orchestra and chorus entitled *Hiawatha's Wedding*. He was born in London, and on his father's side was of African descent. At the age of fifteen, he entered the Royal Academy, continuing his studies until 1896, when he began an independent career as a composer. Both in England and America, which he visited in 1904, 1906, and 1910, his work was held in high regard.

What He Composed. His chief compositions include a *Symphony in A minor*, *Four Waltzes* for orchestra; a *Concerto*, for violin and orchestra; an operetta, *Dream-Lovers*; an oratorio, *The Atonement*, five choral works, pieces for the piano; and songs.

COLFAX, *kohl' faks*, SCHUYLER (1823-1885), an American statesman, was born in New York City, but moved to Indiana in 1836. Elected to Congress in 1854, he served seven terms, and during this time he was Speaker of the House from December 7, 1863, to March 4, 1869. During Grant's first term as President, Colfax was Vice-President of the United States. While holding that office, he was accused of postal frauds and his name was connected with the Credit Mobilier scandal, but nothing was proved against him. He was the founder of the Daughters of Rebekah branch of American Odd Fellowship. See CREDIT MOBILIER; ODD FELLOWS, INDEPENDENT ORDER OF.

COLGATE UNIVERSITY. See NEW YORK (Education).

COLIC, *kol' ik*, a severe cramping pain in some abdominal organ. Colic in babies is a frequent disorder. When located in the stomach or intestines, it is caused by bubbles of air or gas. Holding the baby with his head up, jolting him, or patting his back may give relief by dislodging the gas. Warm applications to the abdomen also may give relief, and so may warm drinks. For this purpose, warm aromatic teas are used.

If the attacks are not too frequent, and if the child is otherwise happy and thriving, it is better not to alter the diet. If, on the other hand, sleep, rest, or nutrition is being interfered with too much, an effort to control the colic by changing the diet should be made. This may consist in giving less food, or in-

creasing the interval between feedings, or by giving food that is less rich, or by substituting dried milk paste for whole milk.

Colic in adults may signify lead poisoning. It may mean gallstones or kidney stones, or it may be a symptom of appendicitis or strangulation of the bowel.

W.A.E.

COLIGNY, OR **COLIGNI**, *ko leen' ye*, GASPARD DE (1517-1572), a noble French admiral and Huguenot leader, remarkable for his prudence, bravery, and high character, when the tendency of the times was treachery, murder, and selfish ambition. He was born at Châtillon-sur-Loing. At the age of twenty-two, he was introduced at court. He won distinction in the wars of Francis I and Henry II, and in 1552 was made admiral of France. As commander in chief of the Huguenots after the death of Condé, he exerted every effort in the cause of his religion. Through his influence with King Charles IX, he aroused the jealousy of Catharine de' Medici; it was she who urged the massacre of the Huguenots on Saint Bartholomew's Day, and Coligny was the first one put to death. See SAINT BARTHOLOMEW'S DAY; HUGUENOTS; CATHARINE DE' MEDICI

COLISEUM. See COLOSSEUM.

COLLATERAL. See MORTGAGE.

COLLECTIVE BARGAINING, the system under which employers deal with their workmen as a single body, rather than individually. Collective bargaining is recognized as one of the most important functions of a trade union, and through it organized labor has achieved most of its success. The employer, instead of negotiating with each of his employees, or determining wages and conditions of work in a one-sided way, makes all arrangements through the representatives of the union. Collective bargaining, however, is not restricted to agreements with unions, for any agreement between employees or employers as groups falls under this head. In the United States, in Canada, in England, and in most other industrial nations, collective bargaining exists in the form of many local trade agreements, and in a number of cases there are national agreements.

E.J.

Related Subjects. For further information on this topic, the reader is referred in these volumes to the articles LABOR ORGANIZATIONS; MINIMUM WAGE, STRIKE.

COLLECTIVE OWNERSHIP. See SOCIALISM.



Photo U & U

SCHUYLER COLFAX

Vice-President of the United States during the first administration of Ulysses S. Grant



Photo Brown Bros

COLIGNY



COLLEGE, a term which in the United States, and to some extent in Canada, has become confused with *university*, has in reality a distinct meaning.

In the United States. In the best usage, the word applies to an institution for higher education which confines its instruction to the so-called liberal arts, that is, science, mathematics, history, literature, etc., giving its members a general education, but no special professional or vocational training. Only those schools are truly *universities* which maintain, in addition to the liberal arts department, special departments for teaching some of the professions, such as law, medicine, pharmacy, dentistry, theology, architecture, engineering, and forestry, or for research by students beyond that required for the degree of Bachelor of Arts, Bachelor of Science, or their equivalents. Some colleges, such as Tufts, which comprises schools of divinity, medicine, and dentistry, are entitled to be termed universities, while others unjustly claim this title. A college may be included within a university, as at Harvard, Wisconsin, and the like, or it may exist as an independent institution.

The first college in America for higher education was Harvard College, founded in 1636. It was followed in 1693 by William and Mary, by Yale (1701), the College of New Jersey, now Princeton University (1746), and King's College, now Columbia University (1754). The University of Pennsylvania was chartered in 1770 to succeed the college founded by Franklin in 1753. Dartmouth College dates from 1769.

In Canada. The Canadian use of the word is similar to the meaning employed in the United States. The tendency in recent years is for isolated colleges to become units in a university, but no regard is paid to geographical location; McGill University of Montreal, for instance, has colleges in Vancouver and Victoria, B. C. Some Canadian schools of secondary education are called colleges, and the term *collegiate institute* is sometimes used to indicate a high school of the first rank. The University of King's College at Windsor, N. S., founded in 1790, was both the first Canadian college of higher education and the first Canadian university.

In Europe. The name *college* is employed in Europe only in accord with its historical

significance. Originally, the word did not deal with education at all, but referred to any organized group of men, such as a labor union. The College of Cardinals, which elects the Pope, is a typical medieval college. In the twelfth century, first at the University of Paris, then at the English universities, groups of poor students were given aid in return for slight services, and each body, usually about twenty students, was called a college. From these institutions have developed the colleges at Oxford and Cambridge, which are groups of students who sleep and eat together, though mingling in classes with men from other colleges of the university. In recent years, many of the English private schools preparatory to the university have been named colleges.

Colleges for Women. Mount Holyoke College, founded in 1837, was the first college for women in the United States. Smith, Wellesley, Vassar, and Simmons colleges are the largest of the present-day women's colleges. Barnard College of Columbia University and Radcliffe College, at Harvard, aim to give to women the same instruction as that which the men receive in their colleges at those universities.

Student Enrollment. In the year 1900, there were enrolled in degree-conferring institutions in the United States 65,274 students, nearly 45 per cent of them being women. Educators then deplored the general lack of interest in college training, and wondered why so few continued their education beyond the high school. Ten years later the enrollment had advanced to 104,098, with women totaling 51 per cent. At the end of the quarter century, the figures had reached over 500,000, and the proportion of women had fallen to 42 per cent. A few years later, over 800,000 students of both sexes were enrolled in the colleges and universities of the country.

To-day the facilities of all great schools are overtaxed. Formerly any student of moral character who could present entrance qualifications which met requirements was welcomed at the college of his choice, but the pressure for several years has led college administrators to establish selective standards. Now those students who give promise of future usefulness in high degree, as far as may be determined by past records, and who have very definite outlooks upon the future, are given preference over

those who wish to enter college merely because college training appears to be a proper thing to acquire.

Intelligence tests are being used to supplement other data regarding students who seek admission to most of the more important privately endowed higher institutions of learning. See **MENTAL MEASUREMENT**.

Enrollment in Medical Colleges. The facilities in the so-called Class A medical colleges throughout the country are utterly inadequate to accommodate students who seek admission and who are properly qualified to pursue medical courses. Many of the leading medical colleges turn away as many students every year as they admit. This is particularly true in respect to women students. The privately endowed medical colleges, principally those located in the eastern section of the United States, restrict the enrollment of women to a fraction of their total enrollment; but the number of women seeking admission to the medical colleges and who are properly qualified to pursue medical courses is continually increasing, with the result that a large proportion of these women are unable to gain admission to any medical college of high standing. This situation is causing a good deal of concern, among women particularly, who believe that there should be no sex discrimination in administering educational facilities. **M.V.O.'S.**

Related Subjects. The reader is referred in these volumes to the articles **UNIVERSITY** and **COLLEGE**, and to the leading colleges named above, as well as many others. State universities are treated in articles relating to the states, as are also numerous colleges in the various states.

COLLEGE, SACRED. See **SACRED COLLEGE**.

COLLEGE OF CARDINALS. See **CARDINAL**.

COLLEGE OF IDAHO. See **IDAHO** (Education).

COLLEGE OF THE CITY OF NEW YORK, a free college for men, maintained by the city of New York. It was established by the board of education upon the vote of the city, in 1848, as the Free Academy. The purpose was to make it possible for ambitious students without funds to receive college training. In 1866 the school was raised to collegiate rank and became the College of the City of New York. High academic standards are maintained. Seven years of instruction are offered; three are preparatory and four are collegiate. The preparatory courses are the same as those given in the city high schools. There are no professional or graduate courses. Tuition, textbooks, and apparatus are free, except in certain technical courses. Students must take prescribed courses until the end of the sophomore year.

In Townsend Harris Hall, the preparatory department of the college, is conducted a night school, largely attended by boys and men who have been unable to complete their high-school work in the day schools. The teachers of the

city may also complete courses at the college, which relieves them of taking certain examinations given by the city board of education. In 1908 the college was moved to its present location on University Heights. The magnificent buildings and equipment there were furnished by the city at a cost of \$5,000,000. The faculty consists of over 500 members. There are about 20,000 students enrolled, including those in the preparatory department and in the evening schools.

COLLEGE OF THE HOLY CROSS. See **MASSACHUSETTS** (Education).

COLLEGE OF THE PACIFIC. See **CALIFORNIA** (Educational Institutions).

COLLEGIATE INSTITUTE. See **COLLEGE**.

COLLIE, *kahl' ie*, originally the sheep dog of Scotland, and now a faithful friend and companion in households everywhere. It is a dog



THE COLLIE

of medium size, about twenty-two inches high at the shoulder, and weighs from forty-five to sixty pounds. It has long, thick hair, with a soft, furry undercoat of shorter hair. Black and tan, black and white, tan and white, or all white, with fox-shaped head, ears erect but drooping at the point, and bushy tail curved upward, the collie is one of the handsomest of dogs, and one of the most intelligent. It will take a flock of sheep to pasture, keep them together, protect them from wolves, and bring them all back safely at night. Or, alert as a fox, quick as a deer, with intelligence almost human, it will protect its master or his property. A Scotch collie is the hero of Oliphant's fine story, *Bob, Son of Battle*. **M.J.H.**

COLLIMATOR, *kol' im a tur*. See **SPECTROSCOPE**.

COLLINS, MICHAEL, President of the Irish Free State for ten days. See **IRELAND** (The Two Governments and Constitutions).

COLLINS, MOUNT. See **ONTARIO** (Surface and Drainage).

COLLINS [WILLIAM] WILKIE (1824-1889), known as the "father of the detective story," was an English novelist. He was born in London, the eldest son of the landscape and portrait painter, William Collins. The name *Wilkie*, by which he is best known, was received from Sir David Wilkie, the painter. Though he spent a number of years in the business world and also studied law, he turned from choice to literature, and when he became acquainted with Dickens, he decided to devote his time to writing. *The Woman in White* and *The Moonstone*, among his best-known works, are masterpieces of baffling mystery, and although the literary value of these and others from his pen has often been questioned, a number of his novels dramatized were at one time popular on the American and the English stage. He also wrote *Armada*, *Man and Wife*, *The New Magdalen*, *The Law and the Lady*, and *The Evil Genius*. In 1873 Collins gave public readings in the United States and Canada from his own short stories.

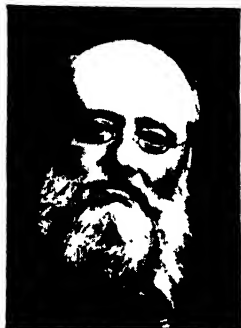


Photo. Brown Bros.

WILKIE COLLINS

COLLODION, *kol o' di on*, **COTTON**. See **SMOKELESS POWDER**.

COLLOIDS, *kol' oidz*, a word derived from the Greek *kolle*, meaning *glue*. It was originally applied to glue-like substances, such as starch and gelatin, which, when mixed with a liquid, diffuse through animal and vegetable membranes very slowly or not at all. This peculiarity of gelatinous substances was discovered by a Scotch chemist, Thomas Graham, in a series of experiments with solutions, beginning in 1861. Graham also noticed that substances in solution which readily pass through membranes, such as salt and sugar, usually crystallize well, and he suggested the division of all substances into two classes—colloids and crystalloids. Modern scientists prefer to speak of matter in the colloidal or crystalloid state, since many substances can exist in both forms; the name colloids is retained, however, for convenience. There are actually many degrees of the colloidal condition.

When a colloidal substance is mixed with a liquid, its molecules arrange themselves into masses, which are sometimes large enough to be seen through a microscope. According to the size of the solid particles, colloidal mixtures are designated as *suspensions* and *colloidal solutions*. In the former, the dispersed particles are of sufficient size to "settle out." In the latter, they are so fine that they do not settle

out, but still are not single molecular units. In a true solution, such as a mixture of sugar and water, molecules of the solid are distributed homogeneously throughout the fluid.

If a colloidal suspension is subjected to a strong light in a dark room, a converging beam being sent through it horizontally, and the lighted part is viewed from above through an ultra-microscope, minute points of light can be seen. These are produced by the diffraction of light rays from the surfaces of the myriads of particles. The particles will be noticed in a lively movement, caused by the impact upon them of the molecules of the solvent. This movement has been given the name *Brownian*, in honor of an early observer of the phenomenon, an English botanist.

Colloids are said to have the *gel* state when fairly rigid, or gelatinous, and the *sol* state when the particles are so far apart that the material resembles a true solution. They easily pass from one condition to the other, though not all colloids readily change back to the original state. Protoplasm, the life substance of cells, is a complex system of colloids, and because of its colloidal condition it exhibits those peculiar properties associated only with living matter. The body ferments that cause the elaborate processes of digestion and assimilation are themselves colloidal. See **BIOLOGY**; **PROTOPLASM**.

R.H.

COLOCASIA, *kol o ka' shi ah*, a genus of plants belonging to the arum family. One species is the *caladium*, or *elephant's ear*, popular in American gardens when planted with cannas. In the South Sea islands, a plant of this genus is extensively used as food, for its starchy roots, when boiled, are much like potatoes. The large, shield-shaped leaves, too, are eaten roasted by the natives of the Hawaiian Islands. In most of the Pacific Islands this plant is called *taro*; in Hawaii, *poi*; in Japan, *saloimo*; in China, *yu-tao*; and in Central America, *oto*. Its botanical name is *Colocasia antiquorum esculenta*.

G.M.S.

COLOGNE, *ko lohn'*, in German, *Köln* (officially *Cöln*). It is not often that a city combines beauty of situation with buildings of surpassing artistry, yet Cologne possesses both. The towers and turrets of this city on the Rhine would be monuments of beauty if set on a barren plain; but when they are made to crown the hills on the bank of a great historic river, they afford a picture which the traveler long remembers.

This ancient city, one of the most interesting historically of Rhenish Prussia, is situated on the left bank of the Rhine, 358 miles by rail southwest of Berlin. It was in ancient days a town of the tribe of Ubii, but in A.D. 50, it received the name of Colonia Agrippina, in honor of the wife of the Roman Emperor Claudius. It steadily grew in importance, and

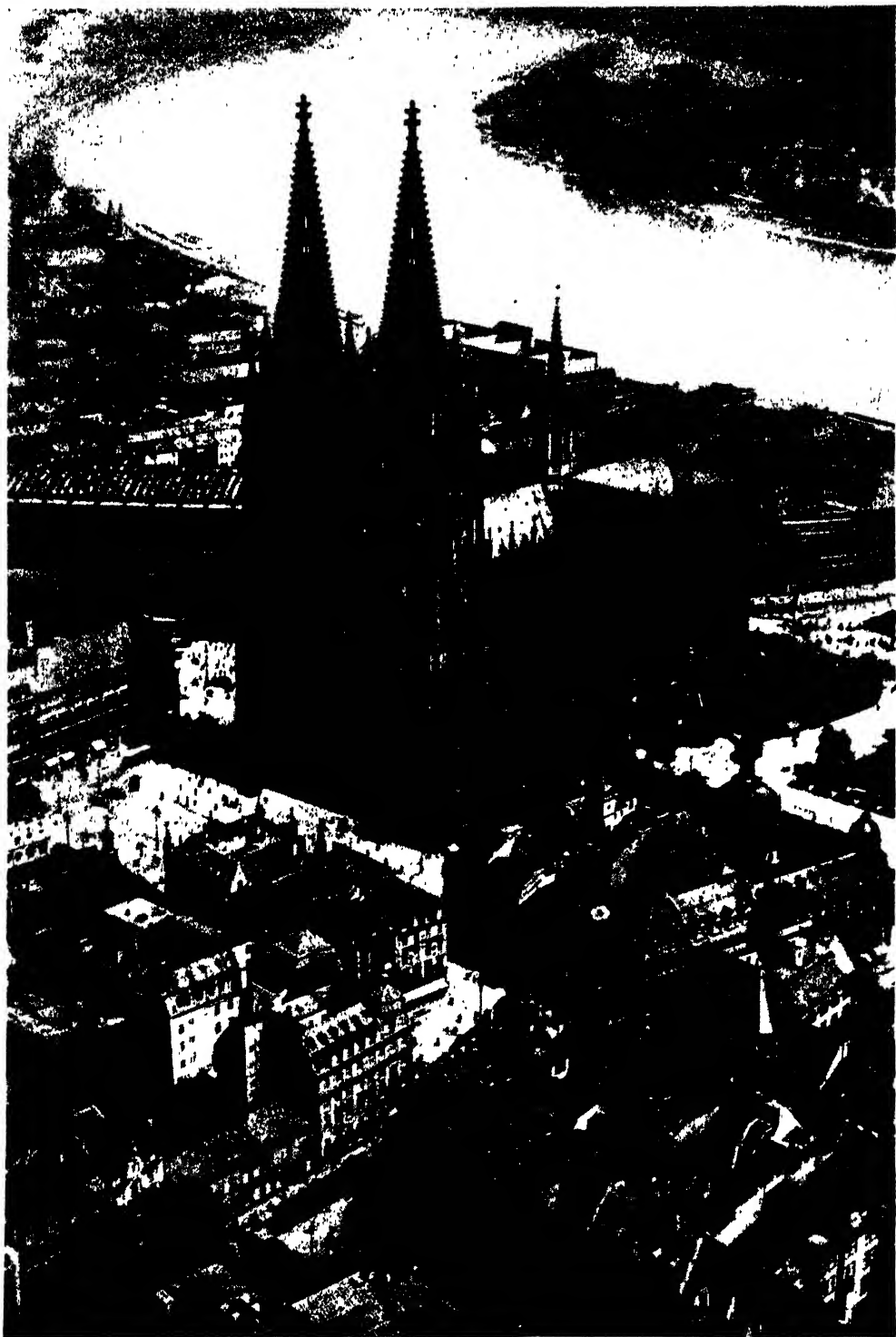


Photo: O R O C

Cologne Cathedral. This is one of the most notable Gothic structures in the world. The twin towers rise 512 feet. The building is 444 feet long. In the illustration, the River Rhine appears in the distance.

eventually became one of the most influential towns in the Hanseatic League (which see). In the sixteenth century, its power waned, and it did not regain its importance until the beginning of the nineteenth century.

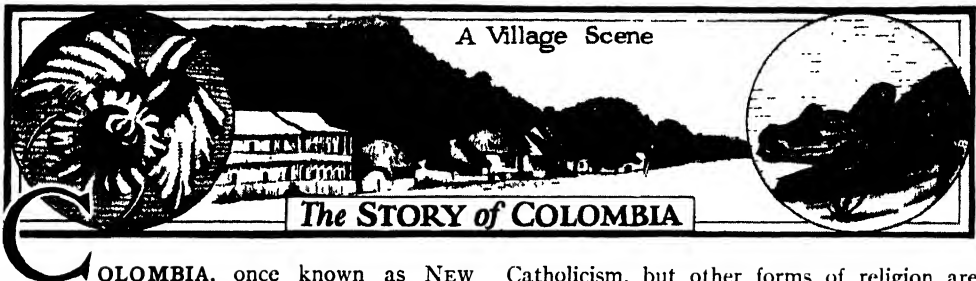
The old portion of the city has crooked, narrow streets, but the new section is thoroughly modern. The removal of the ancient city walls, in 1885, and the later construction of a new line of fortifications nearly doubled the city's area. A fine system of boulevards, the *Ringstrasse*, now occupies the site of the old walls. The city has extensive manufactures of sugar, tobacco, glue, and machinery, and several factories producing the famous perfume known as *cau de Cologne*. Population in 1925, 698,000.

Besides the cathedral, described below, some of the objects of interest to the city's many visitors are the Church of Saint Gereon; the Church of Saint Ursula, where the bones of

11,000 martyred virgins are reputed to be buried; the *Rathaus*, or Town Hall; and the Iron Bridge, connecting Cologne with its suburb, Deutz, across the Rhine.

Cologne Cathedral, the chief ornament of the city of Cologne and one of the most remarkable specimens of Gothic architecture in the world. The present structure was begun in the thirteenth century, on the site of an earlier cathedral which had been destroyed by fire. Early in the nineteenth century, it was thoroughly restored. It is in the form of a cross, and has two of the loftiest towers in the world, each 512 feet high. For many centuries, there existed a tradition to the effect that the Three Wise Men who came from the East to view the infant Christ were buried in Cologne Cathedral. The three skulls were exhibited as late as the eighteenth century, and were credited with miraculous healing powers. The cathedral is noted for its stained-glass windows, its statuary, and paintings.

COLOGNE. See **PERFUME**.



COLOMBIA, once known as **NEW GRANADA**, is a republic in the northwestern corner of South America, which until 1903 included within its area the present republic of Panama. The latter is now geographically in Central America. Colombia was named in honor of Christopher Columbus, who explored a section of the country in 1502. It is a vast land of plains, or *llanos*, table-lands, and mountains, the plains comprising more than half of its area. There is an almost unbroken coast line of over 1,100 miles; 468 miles are on the Pacific Ocean, and about 640 are on the Caribbean Sea. The area is 462,024 square miles.

This republic of very irregular shape is as large as Texas, Oklahoma, Arkansas, and Louisiana; it contains over 30,000 square miles more than the great province of Ontario. Still, in such a country, rich in natural resources, live but about 6,620,000 people; there are only about fifteen inhabitants to the square mile of territory.

The People. The southern and southeastern plains, or *llanos*, are still inhabited by only partially civilized Indians, of tribes which formerly inhabited all of Colombia. The civilized population is centered in the northern and western portions, mostly on the high table-lands from 3,000 to 9,000 feet above the sea level, where the climate is temperate all the year. The religion of the republic is Roman

Catholicism, but other forms of religion are permitted.

The population is singularly diversified. Twenty per cent of the people are white, most of them of pure Spanish blood, imbued with the characteristics of the ruling class of Spain. Spanish is the language of the country. The Indians of unmixed blood constitute nine per cent, and some of them still speak their native languages; most of the other tongues have become extinct. More than fifty per cent of the population is a mixture of Spanish and Indian, and about nine per cent is made up of negroes. The seclusion of the inhabitants of the mountain cities, by reason of the difficulties of travel and transportation, has been productive of conservation of the old Spanish mode of life and habit of thought. This is seen in home furnishings, forms of courtesy, taste in literature, in art, and in amusements, and to a great degree in forms of dress.

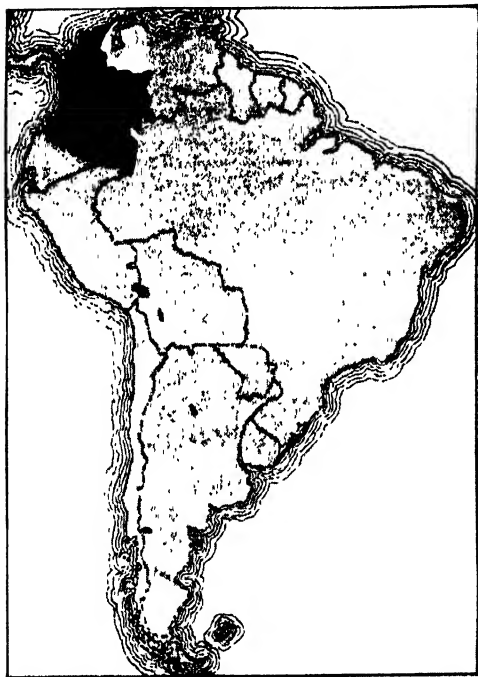
Education. Free education, which is not compulsory, is largely maintained by the state, but some of the schools are under the direction of religious orders. The oldest university is at Bogota. Besides, there is a school of mines at Medellin, and there are nearly forty schools of arts and trades. A national library, museum, and observatory are maintained at Bogota.

Cities. The four towns named below are those of first importance. The sixth city

in size, Manizales, which had 43,000 people, was completely destroyed by fire in 1925.

Bogota, *bo go lah'*, the capital, founded in 1538, lies 8,600 feet above the sea; though it is only $4\frac{1}{2}^{\circ}$ north of the equator, it has a "climate of eternal spring." The San Francisco and San Agustin rivers flow from the mountains through the city and divide the town into four parts. There is a large central square, around which some of the principal buildings are grouped.

Bogota is a center of culture, with public libraries, a national university, several endowed colleges, a botanical garden, and a museum. The manufactures



LOCATION MAP

Showing, also, the proportion of the continent occupied by the republic.

are rather limited. It was first the capital of the Spanish province of New Granada, and in 1819 it became the capital of the new republic. It has the first observatory to be erected in the tropics. Population, 168,000.

Medellin, *ma thel yeen'*, lying inland in a beautiful mountainous region, about 5,000 feet above the sea, is in a mining district, and is growing in importance as a commercial center. It excels in educational facilities, having a college, a national school of mines, and two normal schools. The city was founded in 1674. Population, 85,000.

Barranquilla, *bahr ran keel' yah*, founded in 1629, the chief commercial port, is on the Magdalena River, near its mouth, a few miles from the Caribbean Sea. The river is an artery of trade for many miles inland. Population, 66,000.

Cartagena, *kahr lah je' nah*, founded in 1533, is southwest of Barranquilla on the Caribbean coast. There is a good harbor, but the commerce is not large. Population, 53,000.

Physical Features. One-third of Colombia is mountainous land, with poor transportation facilities. The eastern and southern half consists chiefly of well-watered, treeless plains, or llanos, adapted to pasturing; this section swarms with cattle, but is as yet sparsely settled. Crossing those plains are the rivers Guaviare and Meta, branches of the Orinoco River, which forms part of the eastern boundary; and the rivers Vaupes, Apoporis, Caqueta, and Putumayo, branches of the Amazon. South of the plains lies a tropical forest belt, the most useful trees of the region being rubber.

In the central and western half of the republic are concentrated the principal wealth of the country and the bulk of the population; but it is a mountainous section, whose fertile uplands are of difficult access in spots. There, running from south to north, are three ranges of the Andes Mountains, continuations of ranges in Ecuador. The western range, the Cordillera Occidental, or "de Choco," rises to heights of from 10,000 to 12,000 feet, dividing at the north and extending in one direction into the republic of Panama; in the other ending near the Caribbean Sea.

The central range, the Cordillera Central, or "de Quindio," was so named because crossing its central portion is the famous Quindio Pass, which connects Cali and Ibaguë. This range has the highest peaks in Colombia, several of which are lofty volcanoes; some are active, some semi-active, and others extinct. Tolima, the highest volcano, rises 18,400 feet above sea level. Huila and Purace are nearly as high.

The eastern range, the Cordillera Oriental, is free from volcanoes, and its highest elevation is 16,700 feet. There lie the great temperate table-lands which form the most thickly populated portion of Colombia. Disconnected from the Andes, there is an isolated range running parallel with the Caribbean Sea, in the department of Magdalena. It towers into the Sierra Nevada of Santa Marta, which is covered with perpetual snow, and whose summit rises, as if emerging from the ocean, to a height of 19,000 feet. Important American settlements and banana and coffee plantations are found on the slopes of the Sierra. Dividing the eastern range from the central is the great valley of the Magdalena River, commercially the most important river of the republic, and in length and volume of water the fourth river of the continent. It flows north to the Caribbean Sea, and is navigable for nearly 850 miles of its 1,000 miles of winding length. There is just one break in its even course, 600 miles from its mouth, at the rapids of Honda. These extend for twenty miles.

All the mountain slopes are thickly forested, cedars, hardwood, guayacan, mahogany, other fine woods, cinchonas, aloes, and sarsaparilla trees being found in abundance. In this

western section, too, are found several kinds of serpents, a few species of monkey, jaguars, pumas, tapirs, anteaters, and deer. Lending touches of bright color to the forest greens are humming birds, parrots, and fruit-eating toucans; and flying high are condors and vultures. On the northern coast are the best harbors, Cartagena, Puerto Colombia, and Barranquilla. On the Pacific side are several natural harbors.

Climate. Within a day in the republic of Colombia one can experience almost the extremes of temperature. From the intense heat in the valleys, one can rise to a tableland of almost perpetual spring. Then climbing the mountains and rising above the timber land, about 10,000 feet above the sea, a zone of severe cold and perpetual snow will be reached. The greatest heat is experienced in the belt south of the plains. The upper regions of the mountains have a pleasant climate and abundant rain. On the coast is a region of heat and rains throughout the year.

Agriculture. Although agriculture is the chief industry of Colombia, only a small section of the country is under cultivation, because of lack of means of transportation and communication. Primitive methods are still employed in many sections. In the hot regions, tobacco, sugar cane, cotton, and cacao are the important crops.

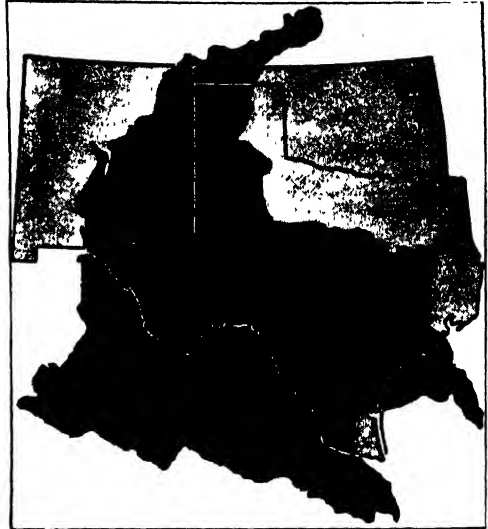
In the temperate western plateaus, coffee, potatoes, wheat, corn, and barley are grown, but the crops are not sufficient to supply all the home demand. Wheat is imported from the United States and rye from Germany. Banana cultivation is extending, and much of the fruit is sent to the United States. Hevea (rubber) trees and tolu balsams are cultivated for their products; wild copaiba trees are likewise tapped. Dyewoods and cedars are abundant on the Magdalena River, but little lumber is exported. Inexhaustible tracts of mangrove are found on the coasts. Cattle-raising is an important industry.

Mining and Manufactures. Colombia is rich in precious metals, and nearly all the fine emeralds mined to-day come from that republic; the working of the mines is a government monopoly. In the production of platinum, Colombia is next to Russia.

Gold and silver abound in the mountain regions. The chief centers of gold-mining are Antioquia and Caldas. The centers of silver-mining are Antioquia, Caldas, and Tolima. Other minerals which abound, but which are little developed, are copper, mercury, cinnabar, and manganese.

It is interesting to note that salt mines north of Bogota, the capital, are also a government monopoly and a great source of revenue. Coal and petroleum exist in extensive deposits, and have attracted the attention of American

and British capital. Iron works, north of Bogota, manufacture wrought iron, rails, castings, etc., and large steel mills are estab-



COMPARATIVE AREAS

Colombia compared with Texas, New Mexico, and Oklahoma.

lished at Pradera. There are valuable pearl fisheries on the coasts.

Although manufacturing industries are still of little importance, great strides are being made in the manufacture of Suaza, or Panama, hats from *jipijapa* and *toquilla* fiber.

Petroleum is becoming an important element in the natural resources of the country. It is carried by pipe line from the interior to the coast at Cartagena. From there it is shipped to the United States.

At Barranquilla are a great number of factories for the making of matches, glassware, shoes, nails, cotton-goods, and ice.

Transportation and Communication. Although much of the inland traffic is by river on the Magdalena and its branches, most of the commercial intercourse must be carried on over simple mule tracks and cart roads, for there are only 1,060 miles of railway. The lines are short, from twenty-five to a hundred miles in length, and form no connective means of travel. The 14,500 miles of telegraph lines are owned by the government. Colombia is in communication with America and Europe by cable and regular lines of steamers. The country has developed no important seaports on the Pacific (its principal city on the western coast being Buenaventura, with a population of little more than 9,000), since to reach this coast from ports on the North Atlantic has necessitated, until recently, the very long journey around the continent. Likewise,

before the completion of the Panama Canal, Colombian ports on the Caribbean had been barred by the Isthmus of Panama from a direct sailing route to the ports of the Pacific. Coffee, petroleum, platinum, and bananas are the chief exports, and the country imports machinery, cotton goods, pipe and fittings, foodstuffs, and metals. Within fifteen years, ending in 1928, the imports increased eightfold; the exports, in the same ratio.

Government. The present fourteen "departamentos," three "intendencias" (intendencies), and seven "commissaries" of the republic of Colombia are governed under a central Constitution. A President is elected for a term of four years, by direct vote, and may not serve two terms in succession. Congress elects two substitutes for a term of two years, one of whom would fill a vacancy during a Presidential term.

Legislative power rests with a Congress composed of a Senate and a House of Representatives. The Senate has one Senator for each 120,000 inhabitants, chosen indirectly by electors; Senators serve four years. The members of the House of Representatives, one for each 50,000 inhabitants, are elected by direct vote of the people, for two years. Governors of the "departamentos" are appointed by the President of the republic. A Cabinet of eight Ministers, appointed by him, assists the President. Every able-bodied man in Colombia is liable to military service, but service is not generally enforced. A Supreme Court, with nine judges, four appointed by the Senate and five by the House, district supreme courts, and provincial courts administer justice.

History. From 1499 to 1536, the coasts of Colombia were explored at various times by Ojeda, Bastida, Columbus, Balboa, Pizarro, Heredia, and Almagro. Between 1536 and 1540, united forces of Spaniards overcame the Indians occupying that region, and Spanish settlements rapidly grew. Until 1718 it was known as the province of *New Granada*. It was then made a vice-royalty.

The great leader, Simon Bolivar, a native of Caracas, liberated from Spain the presidency of New Granada, which included, besides New Granada, the divisions of Ecuador (or Quinto) and Venezuela. These were united, under the name of the Republic of Colombia, by the Constitution of 1810. General William Henry Harrison, afterward President of the United States, was sent as American minister to the new republic, which was welcomed with enthusiasm into the family of nations. But dissensions arose. Venezuela and Ecuador seceded in 1830, the year of Bolivar's death, leaving only New Granada to represent the republic on which high hopes had been built.

Civil war raged from 1825 to 1841. A reformed Constitution in 1843 promised better things. Slavery was abolished in 1852. A

Outline and Questions on Colombia

I. Position and Size

- (1) Location
- (2) Name
- (3) Actual area, 476,016 square miles
- (4) Comparative area

II. The People and Cities

- (1) Races
- (2) Numbers
- (3) Education
- (4) The Cities

III. Physical Features

- (1) Distribution of mountains and plains
- (2) Rivers
- (3) Vegetation
- (4) Climate

IV. Industries and Transportation

- (1) Agriculture
 - (a) Distribution
 - (b) Chief crops
- (2) Mining
- (3) Manufacturing
- (4) Transportation and commerce

V. Government and History

- (1) Republican form of government
- (2) Departments
- (3) Early conquest
- (4) The work of Bolivar
- (5) Civil struggles
- (6) The Panama question

Questions

How great a variation in climate may be experienced in one day's traveling?

How has one of the greatest engineering projects ever undertaken by the United States brought it into conflict with Colombia?

Who was the hero of the struggle for independence? What other South American countries owe their liberty, in whole or in part, to him?

For whom was the country named? Did he ever actually see this part of the world?

Why has not agriculture become more widespread and important? Of what crop does the United States receive the poorer grades?

What are the chief elements of the population?

How long a stretch of railway has the country for each hundred square miles of its territory?

What city of the United States has a population larger than that of this entire country?

Of what valuable mineral resource does the government hold the monopoly?

What effect does the Panama Canal have on the trade of Colombia?

new Constitution, in 1863, restored, under Federal reform, the old name of Colombia—"Estados Unidos de Colombia"—and reduced the Presidential term to two years. In 1886 a new central Constitution was adopted, displacing the former one, and the Presidential term was extended to four years.

In 1903 Colombia rejected the Hay-Herran Treaty with the United States for the concession of the ship canal right-of-way through the Isthmus of Panama to the latter country, demanding a vastly greater payment for the

concession. On November 3 a revolution broke out in the city of Panama, and the new republic of Panama was recognized by the United States four days later. United States marines were landed for the protection of property and the preservation of order, and Colombia was not permitted to attempt the subjugation of the new republic. The suddenness of the movement, and the fact that the United States had long guaranteed to Colombia the possession of Panama, caused great indignation among the Colombians; they were promised \$25,000,000 for their loss, but the treaty authorizing payment was not agreed to in the United States Senate for twenty years; ratification occurred in 1922 A.M.

Related Subjects. The reader is referred in these volumes to the following articles

Bolivar Emerald Panama (History) Panama Canal

COLOMBO, *ko lom' bo*, capital of Ceylon (which see).

COLON, *ko lahn'*, a city at the northern end of the Panama Canal. See PANAMA (The Cities).

COLON, a coin of Costa Rica. See MONEY (Foreign Monetary Standards).

COLON, *ko' lon* (in physiology). See INTESTINE; ALIMENTARY CANAL, illustration

COLON. See PUNCTUATION.

COLON, the official name of the Galapagos Islands (which see).

COLONEL, *kur' nel*, the title of a military officer, borne in the United States army by an officer who holds rank between lieutenant colonel and brigadier general. The corresponding rank in the navy is that of captain; the pay of a colonel ranges from \$3,000 to \$4,000 a year, determined by length of service. A colonel is the commanding officer in a regiment. Staff colonels, who hold no command, are assigned to the various staff corps; that is, to the several departments or bureaus into which the War Department is subdivided, such as the medical, pay, and engineering corps. In the English army, the title of colonel is held by the officer in active command of a regiment. See RANK IN ARMY AND NAVY.

COLONIAL DAMES OF AMERICA, a patriotic society of women, who, following their original purpose, have done much toward the preservation of places and things of historical interest. This society was organized in 1800 in New York City, in commemoration of the success of the Revolution and to collect manuscripts, mementos, relics, etc., of colonial and revolutionary times. Membership is obtained only on invitation of one already enrolled, and is restricted to women directly descended from a distinguished ancestor who resided in America in colonial times. One of the most interesting and valuable collections of the society is in Van Cortlandt Park, New York City.



COLONIAL LIFE IN AMERICA. Powdered wigs and flowered gowns, the steps of the stately minuet, the sober garments of the Puritans, which appear in every pageant of Thanksgiving, give us glimpses of colonial days before national life began. So does the yellowed "sampler," where we find the work and words of the sober little daughter of Miles Standish.

Lora Standish is my name
Lord guide my heart that I may do Thy will,
Also fill my hands with such convenient skill
As will conduce to virtue void of shame
And I will give the glory to Thy name

None of these examples is typical in itself alone of the years of colonial life. They are a few glimpses among the many that have been preserved for us, from the days when a few little settlements clustered along the Atlantic coast and slowly won from the wilderness a living and a nationality.

In order to understand colonial times at all, it must be remembered that from the day when the first colony settled at Jamestown to the day when the settlers were all united closely enough to demand freedom from England, stretched a period of more than one hundred fifty years. Customs and manners changed not only in different colonies, but from one decade to the next.

It is natural that each colony should have differed in some measure from the others, since each had its own reasons for embarking on the perilous journey across the ocean. The Jamestown settlers came under the charter of an English mercantile company, to a land where they were sure gold was waiting for them to gather it in and carry it home. The Pilgrims and Puritans came because they disagreed with the forms of the Church of England, but the fact that the Pilgrims were "Separatists" and came for religious freedom, made them distinct

from the Puritans, who did not wish to separate, but only to be free to work out their own reforms unmolested. Maryland, the "home of tolerance" in America, was open to all who believed in the doctrine of the Trinity; its settlers under Lord Baltimore came for wealth, as did most of the colonists. Each group added its part to the amalgam into which the thirteen colonies slowly grew. The fear of the hostile Indians was the only strong bond between the colonies, for the feeling between them was not particularly friendly.

To know about colonial life and customs is to know not only the founders of the United States, but the grandparents, far removed, of many people who are United States citizens to-day. To read what they wore, what they ate, how they lived, what they thought, and how they worshiped, has all the fascination of stepping back three hundred years in history, and finding oneself on incredibly familiar ground. Many books have been written on the life of colonial days, and only the briefest outline can be given here.

How They Lived. As is the case in nearly all newly settled countries, agriculture was the chief occupation of the colonies. But the types of agriculture in the north and in the south were very different. The soil and climate, the people and their purpose in settling, all had an effect upon the farms and villages. To mention New England and Virginia is not to restrict consideration to those places, but to select modes of living typical of two sections of the country. All of the southern colonies exhibited the characteristics of Virginia in lesser degrees, and New England comprised four of the northern colonies. The middle colonies should be mentioned because of the variety of their settlers, the Dutch and the Quakers and other settlers of Pennsylvania, and the interesting, if unimportant, differences in their manner of living.

It was the necessity for small farms on hard, stony soil, the fishing industry and commerce of the coast, and the fear of Indians, which led the northern colonists to group themselves into villages, instead of living in scattered farmhouses hard to protect; they built these villages at the natural harbors along the Atlantic. The religious life and the democratic system of government also contributed to this tendency.

In the south, the chief revenue-producing crop was tobacco, and it so drained the soil of vitality that new fields had to be planted frequently. Tremendous areas of ground were required, and the individuals to whom these great tracts were given had hundreds of servants to do the work of cultivation. The owner of the plantation lived in a huge house, surrounded with buildings to house the servants, or slaves, and the many small industries which made the estate a self-sufficient community. Each plantation had its carpenter, cobbler, and other workmen who were specially skilled; it was located usually on a river, and had its own dock, so that ocean vessels might come directly to the plantation. With these

arrangements, there was little inducement for towns to grow in the southern colonies until late in the period. Mt. Vernon (which see), the home of Washington, is a splendid example of the type of plantation home which was common, and it preserves in a remarkable degree the old atmosphere of leisure and beauty which the finest traditions of southern colonial life have given us.

In spite of the fact that we hear only of huge estates in tales of colonial Virginia, a

traveler through the south would have seen the farms of many smaller land-holders, as well as of the tenant farmers who often rented land from the plantations. These people lived much as the middle-class farmers lived in all the colonies.

In New England, the social classes were rather well defined as the people of wealth and office-holders, landowners, merchants, and servants, and, although there was not the aristocracy of birth and breeding which existed in England, the colonists soon created a sort of aristocracy of office-holding or wealth. The typical New England household was thrifty, and its members were hard-working, for the things which we find already made for us to-day had to be made by hand, usually in the home. A fireplace like that pictured here was the center of many households. Here all of the cooking was done, in the "Dutch ovens" or in kettles hanging from the huge crane which swung in and out over the fire. If meats were to be roasted, they were hung over the fire, with a basting pan beneath. If bread or cakes of Indian corn were to be baked, hot coals were used to heat the oven

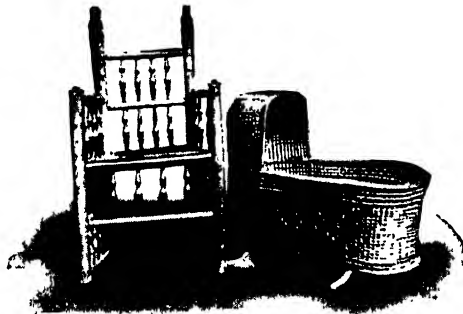
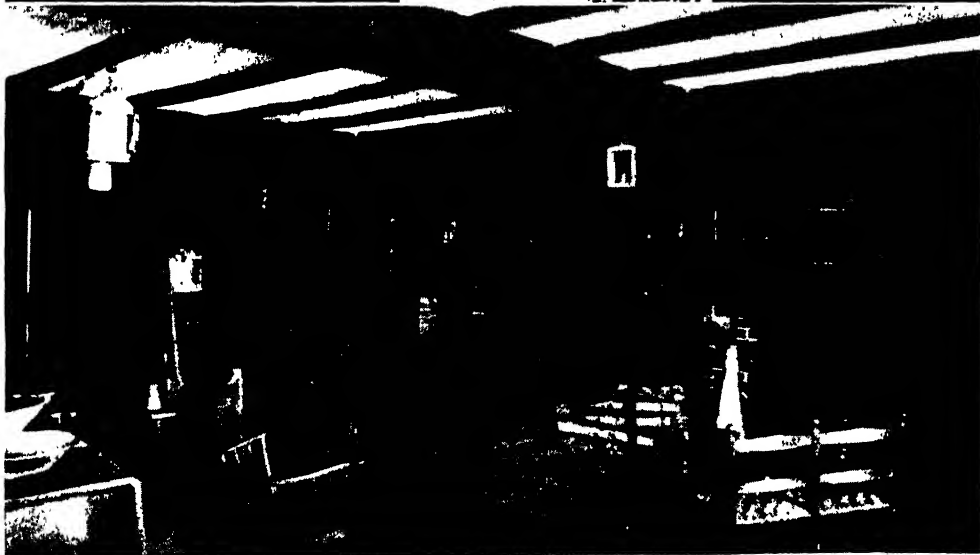


Photo Keystone

TWO HOUSEHOLD ACCESSORIES

Elder Brewster's chair and the cradle of little Peregrine White, he was the first baby born in the Puritan colony. These two specimens of house furnishings are preserved in Liberty Hall, Plymouth, Mass.



Upper Photo. Visual Education Service

In Early New England. Religious services were held in the homes of the Puritans. Below, the old kitchen in the Wayside Inn, South Sudbury, Mass.

beside the fireplace, and when they were withdrawn, the pans of bread were put in. Beside the fireplace, the spinning wheel creaked busily while some elder daughter spun thread to be woven into garments on the loom which was the property of every thrifty family.

In the evening, the family gathered again around the fire, grateful for the protection given against the freezing winds by the high back of the old settle. Precious tallow or bayberry candles might be used, but oftener, when the firelight died down, the family retired to icy bedrooms, where curtains and a canopy over the four-poster beds kept out some of the cold; warming pans, with hot coals within, had taken some of the chill from the huge feather beds.

The fire had to be banked carefully, for if it died out, either a tedious trip to a neighbor's for live coals was necessary, or another fire had to be started with tinder. Friction matches, such as we use now, were unknown in colonial times.

Furniture varied, naturally, from elaborate outfits in the homes of the wealthy to the simplest necessities in the homes of the poor. The great oak chest, and an open-shelf cupboard on which to display the burnished pewter utensils, were common necessities of furnishings; in homes of wealth, furniture was often imported from England.

How They Dressed. When the colonists first came to America, the grueling fight against the wilderness made plain, serviceable clothes a necessity, but the increasing comfort and ease of the eighteenth century, together with the removal to town and city life of many of the colonists, brought the style of dress in some cases to a peak of extravagance. Homespun, dyed in bright colors, remained the favorite material for everyday garments, and deerskin continued to be worn for garments by those who worked in the open. Distinctions between social classes made great differences in costume, and colonial women who dressed in finery which the community judged beyond their means were sometimes arrested and fined. The fashions of Europe were generally imitated, even in those days.

Not only did the costumes indicate the social classes and the work each individual did, but, as the contact with the mother country remained close, it indicated political sympathies as well. The Puritans, or "Roundheads," wore plain clothing, not only because of the hardships of their life, but because the Puritans in England wore the same. The cavaliers of Virginia copied the clothing of the king's court as closely as they could, and many a ship's captain carried back to England lengthy shopping orders for clothing which he was commissioned to buy. Often he was an unskilled shopper, and the distance between the buyer and the shop did not aid him, so that many complaints on the service are in

old records, and many goods were "damned" in the voyage. Tailors in America were not skilled, and as a result, the clothes of the colonists were usually not well formed or neatly made. Each garment was cut down and made over, except in the wealthy families, until hardly a scrap of the original material was left. Official classes had special costumes—lawyers wore black velvet; judges, robes of

red; ministers usually wore homespun, like their parishioners, during the week, reserving their broadcloth for Sundays. Children were quaint images of their fathers and mothers, for in all classes children's clothing was like the grown person's, except in size.

What They Ate. To people who in England had seldom had more than enough barely to satisfy needs, America must have seemed a land of limitless plenty. Deer, wild turkey and other fowl, abundant fisheries, grain, all vegetables of the coarser sort, supplemented by delicacies from England and condiments from the tropics, insured that the colonists should not go hungry. Their outdoor lives made it possible for them to eat amounts which seem hardly credible to us. The greatest difficulty was in keeping perishable foods fresh, for the storing of ice was not practiced for many years.

Tableware of an elaborate and beautiful sort graced the homes of the rich, but the average colonial household had for its table



Photo Visual Education Service

A SERIOUS MOMENT

A Puritan maiden is reprimanded by her pastor for a violation of the stern moral code of the period. [From a painting by Francis Davis Millet.]



Photos Visual Education Service

LIFE IN THE COLONIES IN AN EARLY DAY

Making merry out-of-doors. A typical living room.

equipment cups of pewter, horn, or wood, spoons of the same materials, and plates or "trenchers" of hollowed wood. Napkins were numerous, for much food was taken in the fingers. The first fork was brought to America in 1633. Service varied as widely as tableware, and ranged from the most elaborate and delicately served foods to (in poor families) the one steaming dish placed in the center of the table, from which each member helped himself.

How They Traveled. Trails were so poor, forests so thick, and the danger from lurking Indians so great, that it is no wonder that the colonists had more communication with England than with other colonies. Riding on horses was the simplest way of traveling, but from the rare one-horse chaise to a coach with several fine horses, the carriage was the conveyance of the wealthy families. Stage coaches carried people from one town to another, and oxen hauled the rude carts and pulled the plows.

What They Read and Thought. Few of the colonists were well educated, especially those in the north. Some could not read and write, and there were many who could barely claim that ability. The reading in the New England colonies was confined to the Bible, the hymn book, and the almanac, which was a source of amusement and information for a year. Many of their superstitions and religious beliefs seem to us the height of absurdity and intolerance; the belief in the supernatural had terrible consequences in the witchcraft agitation and the persecution of innocent people.

In spite of superstition and ignorance, they had a wholesome respect for knowledge, and early in colonial days schools were established in New England. Many of these were pay schools, even after a few free schools were

established; most of them taught only reading, writing, arithmetic, and the Catechism. Surveying and navigation seem unusual things to teach small boys to-day, but they were often part of the courses. Girls were not considered capable of receiving the same education as boys, and for them private schools functioned to teach the things which were thought desirable for a housewife and a young lady of fashion to know. Harvard, William and Mary, and Yale were small colleges to which the colonial boys looked forward; they prepared for them in grammar schools and with private tutors. Many of the southern planters employed tutors for their children, and sent their sons to England for college.

Their Amusements. Because life was so stern and hard in New England, it must not be thought that people had no amusements. Every opportunity to turn their work to play was seized, and husking bees, sleigh rides, and quilting parties were as popular as singing schools and spelling bees, diversions which lasted to much later days. Wrestling and outdoor sports were popular with these people, to whom physical prowess was a necessity.

In Virginia, life was easier and gayer. Parties at the plantations lasted for several days, because the guests had to travel long distances, and consisted of aristocratic balls, with their minuets and more rollicking country dances, and included fox hunts and horse racing. Cock-fighting was a rival of racing, and both gave opportunity for the heavy gambling which was a popular amusement. Drinking in all of the colonies, north and south, was a favorite diversion; rum of the north and the fruit brandies of the south were sold in great quantities in all of the colonies.

Their Religion. Two chief denominations, among the many smaller ones, claimed the

allegiance of the colonists. These were the Church of England in the south and the Congregational in New England. Religion played a less important part in the lives of the southern colonists than it had in England, perhaps, for they were somewhat isolated from it. Religion in New England, however, was the essence of life, and everything else was subordinated to it. The New England Sabbath is so famous in accounts of colonial days that it is quite familiar. From Saturday at sundown, no work which could be avoided was allowed to disturb the Sabbath devotions. The dreary meeting-house, with tall, straight-backed pews, hours of sermons, and the ever-watchful "tithing" man to prod drowsy children into wakefulness, sent boys and girls out of doors with whoops of joy when sundown marked the end of the day.

This account does little more than touch the surface of the interesting material which is available about these pioneer ancestors. The Dutch settlers of New York and the Quakers of Pennsylvania, while they lived under the same conditions as the other colonists, are distinctive enough to deserve separate treatment. Dozens of folkways which are as interesting as, and more picturesque than, those mentioned here may be found in books devoted to early America.

A fierce love of liberty, with the realization that laws were necessary to keep personal liberty from harming others, and a high respect for education and the progress it made possible are the chief characteristics which a new land gave to the colonists; these qualities, with their strength and determination, were valuable assets in the great mass of elements which formed the first government of the United States.

Related Subjects. An illustration of the typical clerical dress of the colonial period in the north is given in *The Puritan*, in the article *PURITAN*. The reader is referred to the following titles in these volumes

Blue Laws	Minuet	Puritans
Cavaliers	Pilgrims	Witchcraft

COLONIES AND COLONIZATION. The word *colonist* is derived from two Latin words meaning *a farmer* and *to cultivate*. Even in the days of early history, the resources of a country were sometimes in danger of becoming exhausted as the population increased. Added to the necessity of acquiring more land on which to raise necessary crops for food, was also that desire for expansion which is implanted in the ambitious human breast. The result was that bodies of men in various nations set out in search of new lands which they might cultivate while still enjoying the protection of the mother country. The object was not necessarily to found a new nation, but to go out into the world where opportunities were greater and new land awaited

the plow. These men were strictly *colonists*. They set out to cultivate the soil and develop commerce and defense. There is a considerable difference between a country that is *colonized* and one that is subject only to *military occupation*.

The British have been the world's greatest and most successful modern colonizers; they planted settlements based on permanency—on agriculture and promotion of commerce. Most of their early struggling colonies have grown to giant strength, and have achieved a degree of independence. On the other hand, some countries have instituted military occupation, in the main for the exploitation of overseas resources, with little concern for the treatment due to native races. Germany before the World War presented a typical example of the latter class. See map herewith.

Within comparatively recent years, colonization has become of vital importance to most of the world's nations. Many nations have a surplus of population, which must somewhere find an outlet. Year by year it becomes harder for a thickly settled country to be self-supporting. In this respect, most of the countries on the American continents have great advantages. Their resources are unimpaired; their population is not overcrowded; colonies are not yet needed. It is otherwise with European nations. Europe has been overcrowded for centuries, and year after year many of its people have gone forth to seek homes in new lands.

The Greeks were ahead of all other early nations in the fine art of colonization. Their colonies became flourishing commercial centers, and in time assumed such importance as to rival Greece itself in power and culture. The Romans established military posts only, and their influence over conquered territories lasted only as long as their military occupation; Britain can show little of the results of Roman conquests, and less of Roman colonization.

The lands of the world are now so much divided among nations that there is comparatively little room for colonization. There are no more virgin countries to be appropriated, although there are vast spaces under existing governments for new settlers. E.D.F.

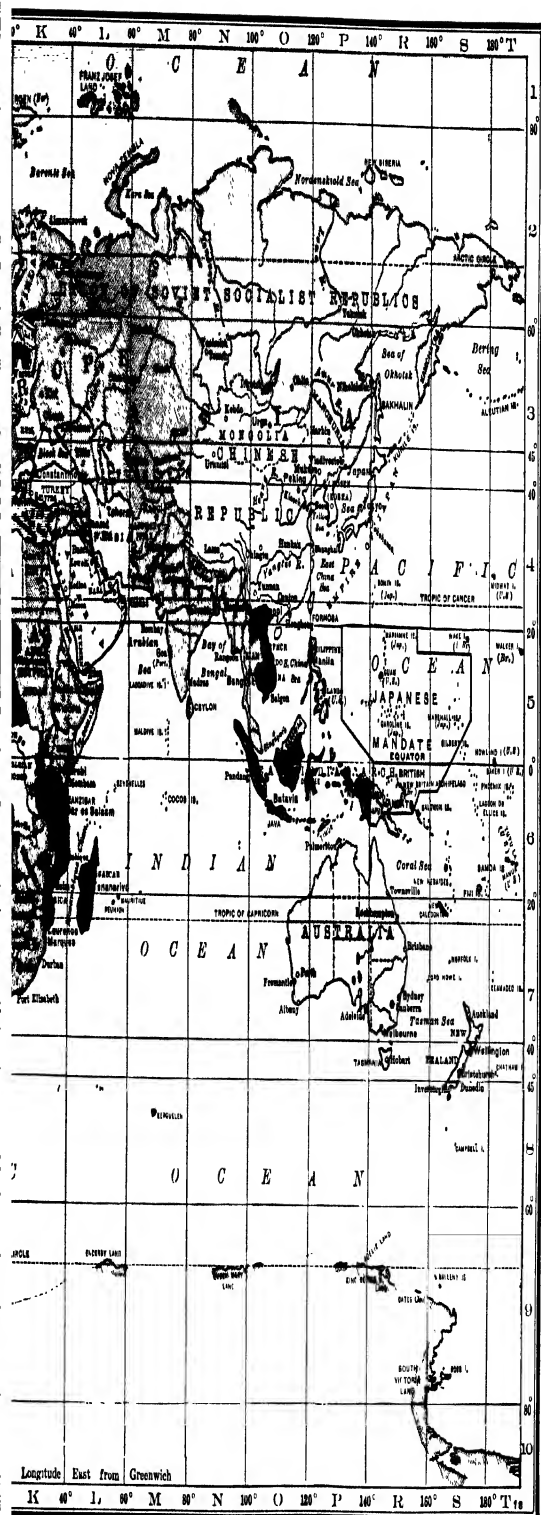
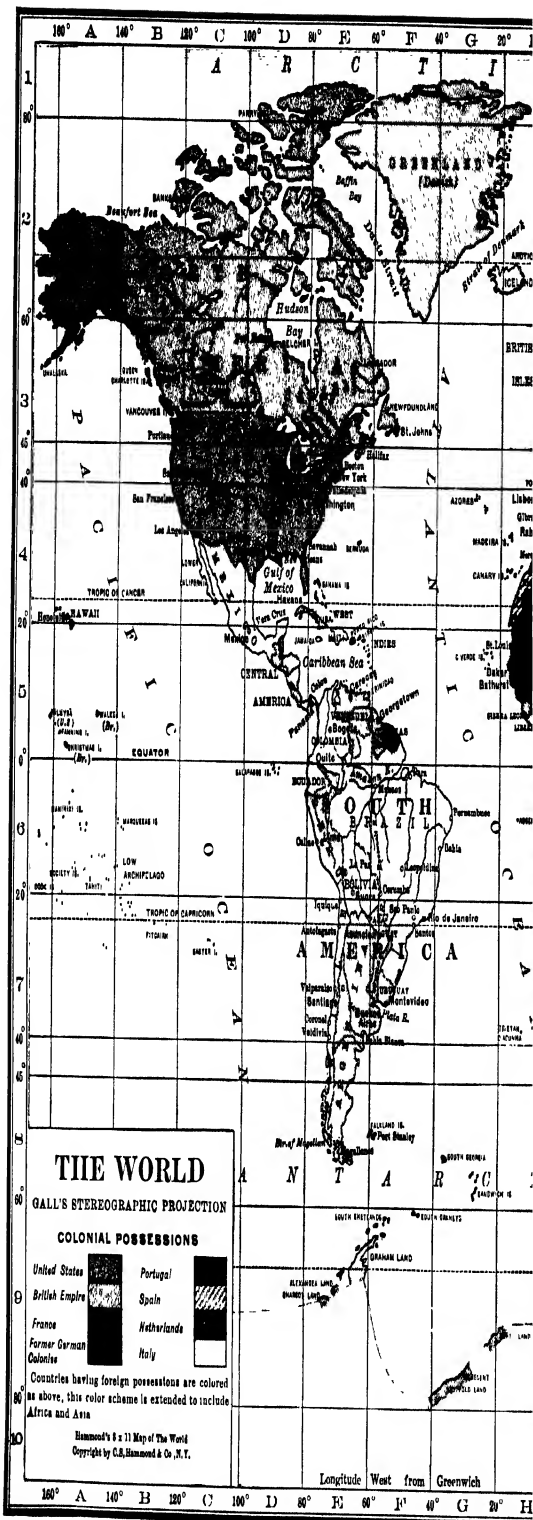
Colonies of the World. The articles on the great countries contain lists of their colonies, with areas and population. In addition, supplementary lists, divided according to continents, will be found with the political maps of the various grand divisions.

COLONNA FAMILY. See ORSINI.

COLOR, kul' ur. A world without color! Who can imagine it? We could as easily picture a world without light as a world without color. In our homes we are surrounded by color. In the street, we see color in every object. In our hours of work and play, in the town, in

THE WORLD

Adelie Land.....	R 9	Coats Land,	H 9	Kurile Islands.....	R 3	Portuguese East Africa,	
Aden, 54,923.....	L 5	Cocos Islands.....	M 6	Labrador, 3,977.....	F 3	3,120,000.....	K 6
Afghanistan, 6,380,500..	M 4	Colombia, 5,855,077..	E 5	Laccadive Islands.....	M 5	Queen Charlotte Islands	B 3
Africa, 137,361,000....	H 5	Congo River.....	K 5	Lagoon or Ellice Islands	T 6	Queen Mary Land . . .	N 9
Alaska, 54,899.....	A 2	Cook Island.....	A 6	Latvia, 1,844,805.....	K 3	Red Sea.....	K 4
Albania, 817,000.....	J 3	Coral Sea.....	R 6	Lena River.....	P 2	Reunion, 173,190.....	L 7
Albanian Islands.....	T 3	Cuba, 2,889,004.....	E 4	Liberia, 1,500,000.....	II 5	Rhodesia.....	K 6
Alexander Land.....	D 9	Czechoslovakia.....	J 3	Libia, 1,000,000.....	J 4	Rio De Oro, 495.....	H 4
Algeria, 6,064,865....	J 4	13,595,816.....	J 3	Lithuania, 2,293,100	K 3	Roosevelt River.....	F 6
Amazon River.....	E 6	Davis Strait.....	F 2	Lord Howe Island.....	S 7	Ross Island.....	S 9
Amur River.....	P 3	Denmark, 3,419,656	J 3	Low Archipelago.....	B 6	Rumania, 17,393,149..	K 3
Anglo-Egyptian Sudan,		Denmark, Strait of	G 2	Lower California.....	C 4	Russia, 147,013,609...	L 3
5,850,000.....	K 5	Dutch Guiana, 113,181	F 5	Luitpold Land.....	G 9	Saint Helena Island,	
Angola, 4,119,000.....	J 6	East China Sea.....	P 4	Mackenzie River.....	B 2	3,747.....	H 6
Antarctic Ocean.....	D 8	Easter Island.....	C 7	Madagascar, 3,512,690	L 6	Saint Lawrence River.....	E 3
Arabia, 5,000,000.....	L 4	East Indian Archipelago	O 6	Madeira Islands, 170,000	G 4	Sakhalin, 203,504.....	R 2
Arabian Sea.....	M 5	Ecuador, 2,000,000.....	E 6	Magellan, Strait of.....	E 8	Samoa Islands, 8,676	T 6
Arctic Ocean.....	C 1	Egypt, 14,168,756.....	K 4	Maldiv Islands.....	M 5	Sandwich Islands.....	G 8
Argentina, 9,839,431.....	E 7	Ellice or Lagoon Islands	T 6	Manchuria, 27,490,000	P 3	Sarawak, 600,000.....	O 5
Ascension Island, 200...	H 6	Enderby Land.....	L 9	Manihiki Islands.....	A 6	Seychelles, 24,523.....	M 6
Asia, 920,000,000.....	M 3	Entrea, 450,000.....	K 5	Manua Island.....	T 6	Siam, 9,121,000.....	O 5
Asir, 850,000.....	L 5	Estonia, 1,110,538...	K 3	Mariana Islands, 5,392	R 5	Siberia, 10,377,900.....	M 3
Atlantic Ocean.....	G 3	Ethiopia, 8,000,000...	K 5	Marquesas Islands.....	B 6	Sicily, 4,061,452.....	J 4
Australia, 5,436,794.....	P 7	Europe, 471,204,000...	J 3	Marshall Islands, 9,108	S 5	Sierra Leone, 1,541,311	H 5
Austria, 6,535,759.....	J 3	Falkland Islands, 3,240	F 8	Mauritius, 385,074.....	M 7	Society Islands, 28,000	A 6
Azores, 242,613.....	G 4	Fanning Island.....	A 5	Mediterranean Sea.....	J 4	Solomon Islands, 167,000	A 6
Baffin Bay.....	E 2	Fiji Islands, 157,266	S 6	Mexico, 14,334,780.....	C 4	South America,	
Baffin Land.....	E 2	Finland, 3,495,186.....	K 3	Mexico, Gulf of.....	D 4	64,536,000.....	F 6
Bahama Islands, 53,031	E 4	Formosa, 3,994,236...	P 4	Midway Island.....	T 4	South China Sea.....	O 5
Baker Island.....	T 6	France, 40,743,851.....	J 3	Mississippi River.....	D 4	South Georgia Islands.....	G 8
Balleny Islands.....	S 9	Franz Josef Land.....	L 1	Missouri River.....	C 3	South Orkneys (islands)	G 9
Baltic Sea.....	J 3	French Equatorial Africa,		Mongolia, 1,800,000.....	O 3	South Shetlands (islands)	E 9
Banks Land.....	B 2	2,845,936.....	J 5	Morocco, 4,816,824.....	H 4	South Victoria Land..	R 9
Barents Sea.....	K 2	French Guiana, 44,202..	F 5	Mozambique Channel.....	L 6	South West Africa,	
Beaufort Sea.....	B 2	French Indo China,		Nepal, 5,000,000.....	N 4	237,237.....	K 6
Belcher Islands.....	D 3	20,493,042.....	O 5	Netherlands, 7,526,606	J 3	Spam, 21,347,335.....	J 4
Belgian Congo, 8,500,000	K 6	French West Africa,		New Britain / rchipelago	R 6	Spitsbergen, 300.....	J 1
Belgium, 7,478,840.....	J 3	13,541,611.....	H 5	New Caledonia, 50,600	S 7	Sumatra, 5,848,872.....	N 5
Bengal, Bay of.....	N 5	Galapagos Islands, 400	D 6	Newfoundland, 263,683	F 3	Sweden, 5,903,762.....	J 3
Bering Sea.....	S 3	Germany, 62,474,872..	J 3	New Guinea.....	P 6	Switzerland, 3,880,320	J 3
Bermuda, 20,127.....	E 4	Gibraltar, 17,690.....	H 4	New Hebrides IslanJs,		Syria, 2,139,082.....	K 4
Biscay, Bay of.....	H 3	Gibraltar Islands.....	S 5	60,000.....	S 6	Tahiti Island.....	A 6
Black Sea.....	K 3	Gold Coast, 2,078,013	H 5	New Siberia.....	R 1	Tanganyika Territory,	
Bolivia, 2,889,970.....	E 6	Graham Land.....	F 9	New Zealand, i, 344, 384	S 7	7,000,000.....	K 6
Bonin Islands.....	R 4	Greece, 5,535,240.....	K 4	Nigeria, 16,500,000.....	J 5	Tasmania, 213,877.....	P 8
Borneo, 1,625,453.....	O 5	Greenland, 13,459.....	F 2	Niger River.....	H 5	Tasman Sea.....	R 7
Bothnia, Gulf of.....	K 2	Guam, 13,275.....	R 5	Nile River.....	K 4	Timor, 377,815.....	P 6
Brazil, 30,635,605.....	F 6	Guinea, Gulf of.....	J 5	Nordenskiold Sea.....	P 2	Togo, 854,340.....	H 5
British Guiana 297,691	J 5	Hatti, 2,028,000.....	E 5	Norfolk Island.....	S 7	Trinidad, 365,913.....	F 4
British Isles, 46,996,664	II 3	Hawan, 255,912.....	A 5	North America,		Tristan D'Acunha	
British Somaliland,		Heraz, 900,000.....	K 4	156,080,000.....	C 3	(islands).....	H 7
300,000.....	L 5	Hoang River.....	O 4	North Sea.....	J 3	Tunisia, 2,159,708.....	J 4
Bulgaria, 5,483,125.....	K 3	Howland Island.....	T 5	Norway, 2,646,306.....	J 2	Turkestan.....	M 3
Cameroon, 2,541,871.....	J 5	Hudson Bay.....	I 2	Nova Zembla.....	L 2	Turkey, 14,000,000.....	K 3
Campbell Island.....	S 8	Hungary, 7,945,878.....	J 3	Oates Land.....	R 9	Tutula Island.....	T 6
Canada, Dominion of,		Iceland, 94,690.....	H 3	Ob River.....	M 2	Uganda, 3,361,000.....	K 5
9,390,300.....	D 3	India, 319,075,132.....	N 4	Okhotsk, Sea of.....	R 3	Unalaska.....	A 3
Canary Islands, 506,414	G 4	Indian Ocean.....	M 6	Oman, 500,000.....	L 4	Union of South Africa,	
Cape Verde Islands,		Indus River.....	M 4	Orange River.....	J 7	6,922,813.....	K 7
149,793.....	G 5	Irak, 2,849,282.....	L 4	Pacific Ocean.....	A 3	United States, 105,710,620	C 3
Caribbean Sea.....	E 5	Italian Somaliland,		Palestine, 757,182.....	K 4	Uruguay, 1,494,953.....	F 7
Caroline Islands, 39,000	R 5	650,000.....	L 5	Palmyra Island.....	A 5	Vancouver Island.....	H 3
Caspian Sea.....	L 3	Italy, 42,115,606.....	J 3	Parana River.....	F 7	Venezuela, 2,411,952.....	E 5
Celebes, 3,089,263.....	O 6	Jamaica, 857,921.....	D 5	Paraguay, 636,000.....	F 7	Virgin Islands, 26,051	E 5
Central America,		Japan, Empire of,		Parry Islands.....	D 1	Volga River.....	L 3
5,997,000.....	D 5	59,736,704.....	P 4	Persia, 9,500,000.....	L 4	Wake Island.....	S 5
Ceylon, 4,504,283.....	N 5	Japan Sea.....	P 3	Persian Gulf.....	I 4	Walker Island.....	A 5
Chad, Lake.....	J 5	Java, 33,417,204.....	O 6	Peru, 4,569,752.....	E 6	West Indies, 8,132,795	E 5
Charcot Land.....	D 9	Kamchatka.....	R 3	Philippine Islands,		White Sea.....	K 2
Chatham Island.....	T 8	Kara Sea.....	M 2	10,350,640.....	P 5	Yangtze River.....	O 4
Chile, 3,754,723.....	E 7	Kenya, 2,630,000.....	K 5	Phoenix Islands.....	T 6	Yellow Sea.....	P 4
Chinese Republic,		Kerguelen Island.....	M 8	Pitcairn Island.....	B 7	Yemen, 750,000.....	L 5
320,650,000.....	N 3	Kermader Island.....	T 7	Plata River.....	F 7	Yenesei River.....	N 2
Chosen (Korea),.....		King George V Land.....	R 9	Poland 27,184,836.....	K 3	Yugoslavia, 12,017,323	J 3
19,519,927.....	P 3	Korea (Chosen),.....	P 3	Porto Rico, 1,299,809	E 5	Yukon River.....	A 2
Christmas Island.....	A 5	19,519,927.....		Portugal, 5,957,985.....	II 3	Zanzibar, 197,000.....	L 6



the country, in shops and factories, in churches, schools, and playgrounds, in the parks and on the river, on the sea and in it, in the clouds and stars, and even in the air, we are ever in a world of color.

Color cannot be studied or understood apart from light, for color is a property of light, just as pitch is a property of sound. Many years ago people believed that of all the known colors white light was the simplest and purest; but the great scientist, Sir Isaac Newton, disproved this by an interesting experiment. He admitted a beam of sunlight through a small aperture in the shutter of a darkened room, and let the beam pass through a glass prism to a white screen. On the screen there appeared not the colorless image of the sun but a band of many colors, arranged in the following order—violet, indigo, blue, green, yellow, orange, red. Such a band of colors is called a *spectrum*. Newton proved by his experiment that white light is a mixture of all the colors of the spectrum; these same colors appear in beautiful form in the rainbow, which is produced when the sun shines on raindrops. The drops act like tiny prisms, and separate the rays into the seven colors by refraction.

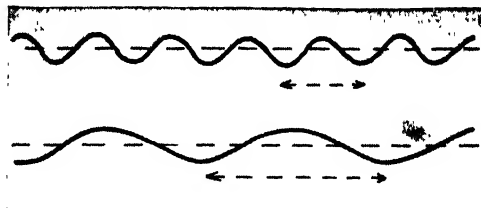
Newton further proved his theory by another interesting experiment. He painted a disk with sections of the seven colors found in the spectrum. When this disk was rotated rapidly it appeared white. Thus, he not only split up a beam of light into seven colors, but he also combined them again to produce white light. See illustration on next page.

[Particular attention is here directed to the article NEWTON, SIR ISAAC.]

Scientists have learned many other interesting facts about color. Light waves, they tell us, have different lengths, and each color corresponds to a certain wave length. The waves that produce the sensation of red light are seven two-hundred-and-fifty-thousandths of an inch in length ($\frac{7}{250,000}$ inch). They are about twice as long as those that produce violet ($\frac{1}{125,000}$ inch), which is the last color in the spectrum whose wave length is capable of producing visible effects. We are enabled to distinguish colors because the waves of light cause vibration of fibers of the optic nerve (see EYE), and the different colors appear according to the varying lengths of these light waves. A piece of white paper has no color because it reflects all wave lengths equally, but a piece of red cloth looks red because it reflects only those waves that produce red light, and it absorbs the others. A black object, on the other hand, absorbs nearly all colors. In addition to the light waves which affect the eye and hence are visible, there is an infinite number of waves both longer than red and shorter than violet. Some of these may be detected by the photographic plate, and some

by other instruments. Among the shortest waves thus far discovered are the X-rays, the gamma rays, and the cosmic rays. All these are so minute that they will pass between the atoms of very dense substances.

Among the longer waves are radiant heat waves and the electromagnetic waves used in radio and other wireless communication. Their



REPRESENTING WAVES OF LIGHT

The length of the waves determines color. Wave motions of two different lengths are shown. Violet waves are the shortest in the spectrum, and red waves are the longest.

length is measured in yards or miles, instead of fractions of an inch.

The range of radiant waves between the two extremes above noted is very great. If we represent it on a scale of fifty-five octaves, only one of these octaves is within the range of the human eye. The others must be investigated by means of instruments which can translate them from the invisible to the visible world.

By this explanation of the relation of light to color, it is made plain why the color of an object is determined by its ability to reflect or absorb light waves of a certain length. Now we may see why the sky looks blue in the daytime. In the atmosphere are many tiny particles of dust, which reflect the blue waves and permit the others to pass. Were the air entirely free from dust, it would look dark. At twilight, it is impossible to distinguish colors reliably. In more than one legal trial, this fact has been used to discredit witnesses.

How to Use Color. We cannot make colors as beautiful as those of the rainbow, but we can imitate or represent these colors with *pigments*. Pigments are coloring matter, and are found in many places. Some pigments come from the earth, and we obtain them in clay banks and mines. Yellow ochre is a pigment of the first kind, and cobalt blue comes from minerals. Plants and trees provide us with many dyestuffs and pigments, and the great group of aniline dyes is obtained from coal tar.

We cannot use pigments just as we find them. If, for example, we should spread yellow ochre on a house, the first rain would wash it off. Pigments must be mixed with something to make them adhere. If we mix yellow ochre with linseed oil, we form oil paint, which is permanent. If we mix yellow ochre with glycerin and gum arabic, we form a sub-

stance which will dissolve in water. This we call water-color paint. If we mix yellow ochre with chalk, we form colored crayons and pastels. In all these mixtures, the pigment is the same, but the mixing medium determines the kind of paint formed.

Since color is so universal, and since we cannot escape from it, even if we would, it is of the greatest importance that we understand the laws that govern the use of color. We cannot pick out a suit of clothes or a necktie, a dress or a hat, without exercising a choice of color. What can help us to make the right choice?

It is knowledge of color combinations and harmonies. The color chart can be used as an aid in the study of color, just as the piano is used in the study of music. If we strike but one note on the piano, we do not produce music; but if we strike at the same time two other notes related to the first note, we produce a harmony of sound which we call a chord. So, with the color chart; if we select from it any one color, as for instance, blue, we do not obtain harmony, but if we take that same blue as one note, and use with it two other related notes, as a lighter blue and a darker blue, we obtain a color chord. Let us study the color chart, and use it as a guide in our selection of colors for any purpose.

Primary Colors. There are three colors, yellow, red, and blue, which are, in pigments, the sources of all other colors. That is, from mixtures of these three colors all other colors may be obtained. For this reason, yellow, red, and blue are called *primary colors*.

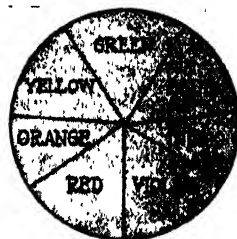
Binary Colors. The union of any two primary colors produces a new color called a *binary color* (*binary means made from two*). That is, the union of yellow and red produces the binary orange; the union of yellow and blue produces the binary green; the union of red and blue produces the binary violet, or purple. Orange, green, and violet, then, are called the binary colors.

Hue. A color *hue* is the step between a primary and a binary color. In the color chart, you will notice that yellow appears at the top of the circle. Between the primary yellow and the binary orange (on the left) you will see a color that is made of a mixture of these two. It is the hue yellow-orange. Between orange and red is the hue red-orange. Between red and violet is the hue red-violet. Between violet and blue is blue-violet. Between blue and green is blue-green, and between green and yellow is yellow-green. This completes the color circuit.

Tint and Shade. The colors that you see in the outer circle of the color chart are as bright as they can be made with pigments. They are called colors in *full intensity*. Any tone of red, for instance, that is lighter than red in full

intensity, is a *tint* of red. Any tone of red that is darker than red in full intensity is a *shade* of red. People often confuse the two terms *tint* and *shade* in speaking of the different tones of a color.

Complementary Colors. There are certain colors that seem to strengthen or emphasize each other when they are seen together. Such colors are said to be *complementary* to each other. In the chart, the colors are so arranged that color complements are opposite each other. Yellow, for example, is placed opposite its complement, violet; red is opposite its complement, green; blue is opposite its complement, orange; yellow-orange is opposite its complement, blue-violet; red-orange is opposite its complement, blue-green; and red-violet is opposite its complement, yellow-green.



THE SEVEN COLORS
OF SUNLIGHT

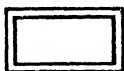
If these colors are painted on the disk in correct proportions and the disk is rotated rapidly, the colors will combine and appear white. The illustration is a reproduction of the rotating disk of Sir Isaac Newton (which see)

Although when *seen* together, complementary colors emphasize and strengthen each other, when *mixed*, as in using water or oil colors, they produce the opposite result. That is, yellow mixed with a little violet will produce a grayed yellow; red mixed with a little green will produce a grayed red; and blue mixed with a little orange will produce a grayed blue.

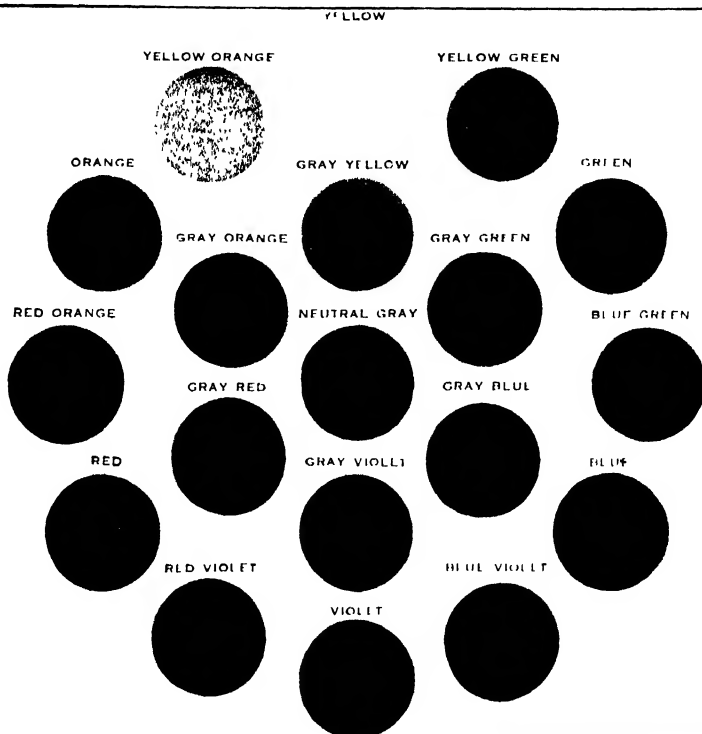
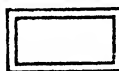
It is this mixture of complementary colors which has produced the second circle of colors in the chart, marked gray-yellow, gray-orange, gray-red, gray-violet, gray-blue, and gray-green. When equal quantities of these complementary colors are mixed, the pure, or neutral, gray found in the center circle is produced.

Another Classification. A classification proposed by the late Professor Munsell is accepted by some authorities. According to this theory, there are five fundamental colors, red, yellow, green, blue, and purple. In this scheme, blue-green is the complement of red; purple-blue is the complement of yellow; red-purple is the complement of green; yellow-red is the complement of blue; and green-yellow is the complement of purple.

How to Use Color Knowledge. Now that we know what is meant by primary and binary colors, by hues, and by the tints and shades of all colors, by complementary colors, and how they affect each other when mixed, how can we use our color knowledge? We must learn what colors can be depended upon to look well, when



COLOR SCIENCE



COLORS IN FULL INTENSITY AND GRAYED COLORS

3 PARTS YELLOW ADDED TO	+		-		MAKE GRAY YELLOW
	+		=		MAKE GRAY ORANGE
3 PARTS ORANGE ADDED TO	+		=		MAKE GRAY RED
3 PARTS RED ADDED TO	+		=		MAKE GRAY GREEN
3 PARTS GREEN ADDED TO	+		=		MAKE GRAY BLUE
3 PARTS BLUE ADDED TO	+		=		MAKE GRAY VIOLET
3 PARTS VIOLET ADDED TO	+		=		

used in house decoration, in dress design, or in any other practical way.

If we wish to use any one color in full intensity, as a green feather on a hat, we should be sure to use it with black, white, or gray. If we wish to paint the shutters on a house bright green, we should paint the house light gray or white. If we wish to use blue and orange in a costume, we must use a small quantity of the intense color, as a bright orange tie, buckle, flower, or bit of trimming, with a large mass of grayed blue for the main part of the costume.

While complementary colors can be depended upon to produce harmony, they should seldom be employed in full intensity, except where brilliant or startling effects are desired, and even then they should be combined with black, white, or gray.

Tints and shades of any one color are sure to be harmonious when used in a costume or in house decoration. Here, again, touches of black or white, or both, will add much to the interest. For example, a costume in tones of blue will be improved by some addition of white; a room in tones of buff could carry a trim of white paint; a dark blue suit of clothes looks well when worn with a white shirt, a white or straw hat, and a black tie.

Other groups of colors that can be depended upon to produce harmony are the neighboring,

or analogous, colors. For example, yellow, yellow-green, and green in their tints and shades might be employed in the color schemes of fabrics, for curtains, pillow covers, carpets, and hangings. Yellow, yellow-orange, and orange are brilliant and showy, and could be used in window dressing, in flower arrangements, and in millinery. Red-violet, violet, and blue-violet could be applied in the designing of silks and velvets. Additions of black and white to all color combinations are generally desirable; light tints call for a touch of black.

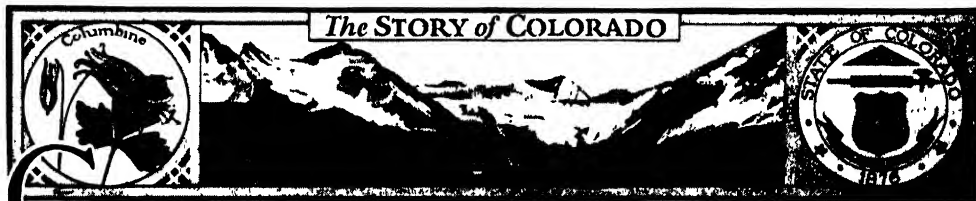
You will see how practical and valuable a knowledge of color combinations may prove to those who desire to study color. The color chart is a sort of compass, to be used in sailing through the sea of color by which we are surrounded.

A. LaF.

Related Subjects. The following articles in these volumes contain much information which will be found interesting and helpful in a study of the topic of color:

Aniline	Indigo	Rainbow
Black	Interior	Red
Blue	Decoration	Sepia
Brown	Light (with	Spectrum
Carmine	list)	Analysis
Chrome	Ocher	Ultramarine
Coal Tar	Orange	Umber
Costume	Paint	White
Green	Purple	Yellow

COLORADO, a term applied to cigars, meaning medium in color and strength.



COLORADO, a state in the heart of the Rocky Mountains, is called the CENTENNIAL STATE because it was admitted to the Union in 1876, the hundredth anniversary of American independence.

The name *Colorado* means literally *colored red*; it was borne first by the Colorado River and later bestowed on the territory. Colorado's record has a background of forgotten races, of primitive civilization, of discovery, of adventure, of colonial experiment. Long ago, before ever a white man entered the state, Indians lived in the southwestern part. Upward from the south the Spanish came on their far quest for golden treasure, while later the trappers followed along the Indian trails in search of furs. With the discovery of gold, for a time Colorado's greatest wealth, long lines of wagons crept across the plains, and the state's first "empire builders" arrived.

Miners were first, but Colorado's early citizens discovered other wealth in the state. Great

herds soon roamed the plains and grassy valleys, and stock raising was the second phase of growth. Forage and food crops have been the latest development, until now Colorado's wealth flows from three great sources, agriculture, mining, and manufacture.

Size and Location. Colorado forms a great quadrilateral, and, save for Wyoming, is the only state that is bounded by four straight lines. It is surrounded by seven states. Wyoming and Nebraska are on the north, while on the east the plains of Colorado join those of Kansas and part of Nebraska. Oklahoma and New Mexico meet Colorado on the southern line, and Utah on the west completes the rectangle. At its southwestern corner, Colorado meets, in a "four corners," the seventh state, Arizona. With an east and west length of 375 miles, a north and south breadth of 276, and an area of 103,500 square miles, it is the seventh state in size, or nearly as large as Illinois and New York combined.

The People and the Cities. In 1864 Colorado consisted of a few mining settlements along the eastern base of the Rocky Mountains. Northward and westward stretched the wilderness. To the south lay New Mexico, with its scattered groups of Spanish settlers, while between the little Colorado communities and the settled eastern portion of the United States rolled 400 miles of plains in which roamed marauding bands of Indians, ever threatening the slim contact the settlers maintained with the states. Under such conditions lived the hardy groups of pioneer Americans who formed the early population of the state.

The growth in population has been steady but not phenomenal. For a long time, as is usual in any mining state, the vast majority of the inhabitants were men, but as boom conditions have given place to a settled industrial development, this proportion changed, until to-day the men comprise but little more than half of the population. Colorado's population of 939,629 in 1920 was greater than that of any other Rocky Mountain state, but notwithstanding its large area, it is thirty-third among the states in number of inhabitants. There are fewer than 1,400 Indians left in the state. In 1920 there were 9.1 people to the square mile, and in 1924 it was estimated that there were 9.2. Only a little over twelve per cent of the population is foreign-born; the chief alien nationalities represented are German, Russian, Mexican, and Italian.

Nearly fifty per cent of the people live in cities or towns of over 2,500, and this urban population is increasing more rapidly than the rural. There are not, however, very many large cities; fewer than ten have a population of more than 10,000. Denver, the capital, is the largest city and the railroad center of that part of the United States. Other important cities are Pueblo, Colorado Springs, Trinidad, Boulder, Fort Collins, Greeley, and Grand Junction.

Education. Colorado's public-school system compares favorably with the best state public-school systems in the country. It is being enlarged and expanded rather rapidly to meet the needs of a growing population, there being few states where the percentage of increase in school buildings and in teachers employed has been greater in the past decade. In recent years, the number of schools has been decreasing rather than increasing, however, due to the establishment of large numbers of consolidated schools in the rural districts, which provide much better educational facilities than the smaller schools they replace.

The state has a large permanent school fund, derived from the sale of land given the state by the Federal government for the benefit of the public schools, and known as state school land. By far the largest part of the revenue of the

public schools is derived from direct taxation. Special county tax levies are made for school purposes. The percentage of illiteracy is small, only 3.2 persons out of every hundred over ten years of age being unable to read and write.

There are included in the state system, the State Teachers' College at Greeley; Adams State Normal School at Alamosa; and Western State College at Gunnison; the Agricultural College at Fort Collins; the State School of Mines and the Industrial School for Boys at Golden; the Industrial School for Girls at Morrison; and home and training schools for mental defectives at Grand Junction and Ridge; a School for the Deaf and Blind at Colorado Springs, and the School and Home for Dependent and Neglected Children at Denver. There are also other institutions of high rank, as noted below:

Colorado College, at Colorado Springs, was founded in 1874. There are departments of engineering, forestry, and business administration, as well as courses in arts, science, and philosophy.

Colorado Women's College, at Denver, was founded in 1909, and is a small but well-known college.

University of Colorado is a coeducational state university, located at Boulder. It was incorporated by the legislature of Colorado Territory in 1861, and in 1877, the year after Colorado became a state, was formally opened on its present basis. The university now comprises numerous departments, including the colleges of liberal arts, engineering, and pharmacy, the graduate school, the schools of medicine, law, and business administration, the colleges of education and music, the summer quarter, and the university extension division. The Medical School of the University is located at Denver.

University of Denver is the oldest institution for higher education in the Rocky Mountain states. It was founded at Denver in 1864, and for the first sixteen years was known as Colorado Seminary. In 1880, when a reorganization took place and the educational work was broadened, the present name was adopted. On the campus at University Park are the college of liberal arts, the graduate school, the summer school, and schools of chemical and electrical engineering and pharmacy. The professional schools of law, dentistry, and commerce, and the teachers' college are located downtown.

Other Institutions. Besides county and city institutions, there are under state control an insane asylum at Pueblo, a soldiers' and sailors' home at Monte Vista; a workshop for the blind in Denver; a state prison at Cañon City; and a reformatory at Buena Vista. A new state psychopathic hospital was opened in 1925. Colorado has been among the most progressive states in its development of corrective institutions, and the Denver juvenile court has attracted world-wide attention (see JUVENILE COURT; LINDSEY, BENJAMIN BARR).

Geography of Colorado

Surface Features. Colorado, which is crossed by the Great Divide, that dominating



Photos: P & A; Denver & Rio Grande Ry.

Colorado Wonderland. The Royal Gorge, viewed from above; the top is reached by a ten-mile drive from Canon City. Probably the world's largest balanced rock, over 100 feet high, in Glade Park, west of Grand Junction. In the Moffatt Tunnel (see the article **MOFFATT TUNNEL**).

height of land which separates the eastward-flowing rivers of North America from the westward-flowing, has the highest mean altitude of any state. It has three topographic zones—the eastern plains, rising from an elevation of a little less than 4,000 feet along the eastern border to 6,500 feet at the mountain front; the Rocky Mountain zone, the east side of which rises abruptly from 6,500 feet to the crests of the ranges, where many peaks are over 14,000 feet high; and the western plateau zone, extending to the Utah line.

The continental range of the Rocky Mountains extends across the state from north to south, near its center. In the western section are three more or less prominent ranges, including the White River Mountains, in the west; the Park and Saguache, somewhat farther east, and the Front Range, near Saguache. Among the mountains are numerous plateaus known as parks, with fertile surface and healthful climate. In many places the scenery is superb, especially in the localities known as Monument Park and the Garden of the Gods.

Five hundred square miles of the finest of the Rockies extend through Colorado into Central Utah. Here are to be found forty-two of the fifty-four named peaks of the United States which exceed 14,000 feet in height. World-famous mountains, such as historic Pike's Peak, Mount Massive, and Mount Elbert; the highest of all, Sierra Blanca of the triple crowns; the venerated Holy Cross; the curious Lizard Head; the weird Needles; the gigantic Sopris; "old" Uncompahgre, the big chief; proud Nebo; picturesque Timpanagos; and others as worthy of mention, are part of this lofty wonderland.

The Rivers. The water area of Colorado is about 300 square miles; there are no lakes of any considerable size, and practically all of this area is in rivers. Among all the states in the Union, Colorado stands first in the number of rivers which rise within its borders. The eastern portion of the state is an elevated tableland, drained by the South Platte and Arkansas rivers, while in the western part are the Green, Colorado, Gunnison, San Juan, Yampa or Bear, and the La Plata. The Rio Grande flows east and south through the San Luis Valley.

With the scenic wonders of this state, the rivers have almost as much to do as the mountains; for they do not flow sluggishly over level plains, but leap down the mountain valleys, and in their age-long travels have carved remarkable gorges. Among these are the canyons of Big Thompson, the Gunnison, and the Royal Gorge, 3,000 feet deep, through which the Arkansas finds its way from its source 10,000 feet above sea level to the plains country. In the more level parts of the state, rivers of the other type are to be seen. Thus, the South Platte, which has its source 11,000 feet above

the sea, is in Northeastern Colorado a broad, slow-moving stream, fringed with the cottonwoods so characteristic of that region. All the Colorado rivers are useless for navigation; the mountain streams are too precipitous in their courses, and those of the plains are practically drained for irrigation purposes (see *Agriculture*, below).

The Geology of Colorado. Of all the localities in the world, Colorado presents within its area of mountain ranges and different formations the most fascinating and varied study. The ranges of Colorado are said to be as old as the Silurian Period, and even are thought to reach back to the Azoic Era (see *GEOLOGY*). They were not as high nor as broad as they are now, their elevation being gradual. But as early as the Silurian Age, the mountains consisted of separate chains, and were long, rocky islands, and inland seas marked the spots where now are the great parks. The ocean swept over what is now the valley of the Rio Grande, passing up to the head of the San Luis Valley, and probably touched some of the inland seas between the two ranges.

The Carboniferous Age followed, and an abundant vegetation sprang up. Plants of all kinds grew rank and luxuriant, covering practically the whole world, because of the same sort of moist, warm air on which to thrive. There were great forests of immense trees, mosses with stems as thick as a man's body, with branches fifty feet high, and ferns that grew into great, soft-bodied trees which would fill a good-sized room. During the Tertiary Period, a large swamp existed where Denver, Golden, Pueblo, and Trinidad now stand, extending north into British Columbia and south into New Mexico. In this swamp, a rank vegetation flourished for a long period.

After the coal deposits, lakes of fresh or brackish water covered most of the western and central parts of Colorado, as well as the valley at the foot of the eastern range. At this time, the higher grounds were covered with palms and trees indigenous to a tropical country. The wrinkling and folding of the earth's crust brought to the surface some of the coal seams which had been formed; it is this coal which is being mined to-day in Colorado. There is a mountain of natural coke—burned by volcanic fires—at Bayfield, on the Los Pinos River. Natural wood, petrified by silica, is found in large quantities in South Park, and at the bases of the mountains. A portion of what must have been an immense bed of lava can be seen near Golden, forming a small *mesa*, or table-land, known as Table Mountain. The lava here is 250 feet thick.

The Glacial, or Drift, Epoch followed in due course of time. But since that icy era, wonderful changes have taken place. The climate has changed, the glaciers have gone from the val-

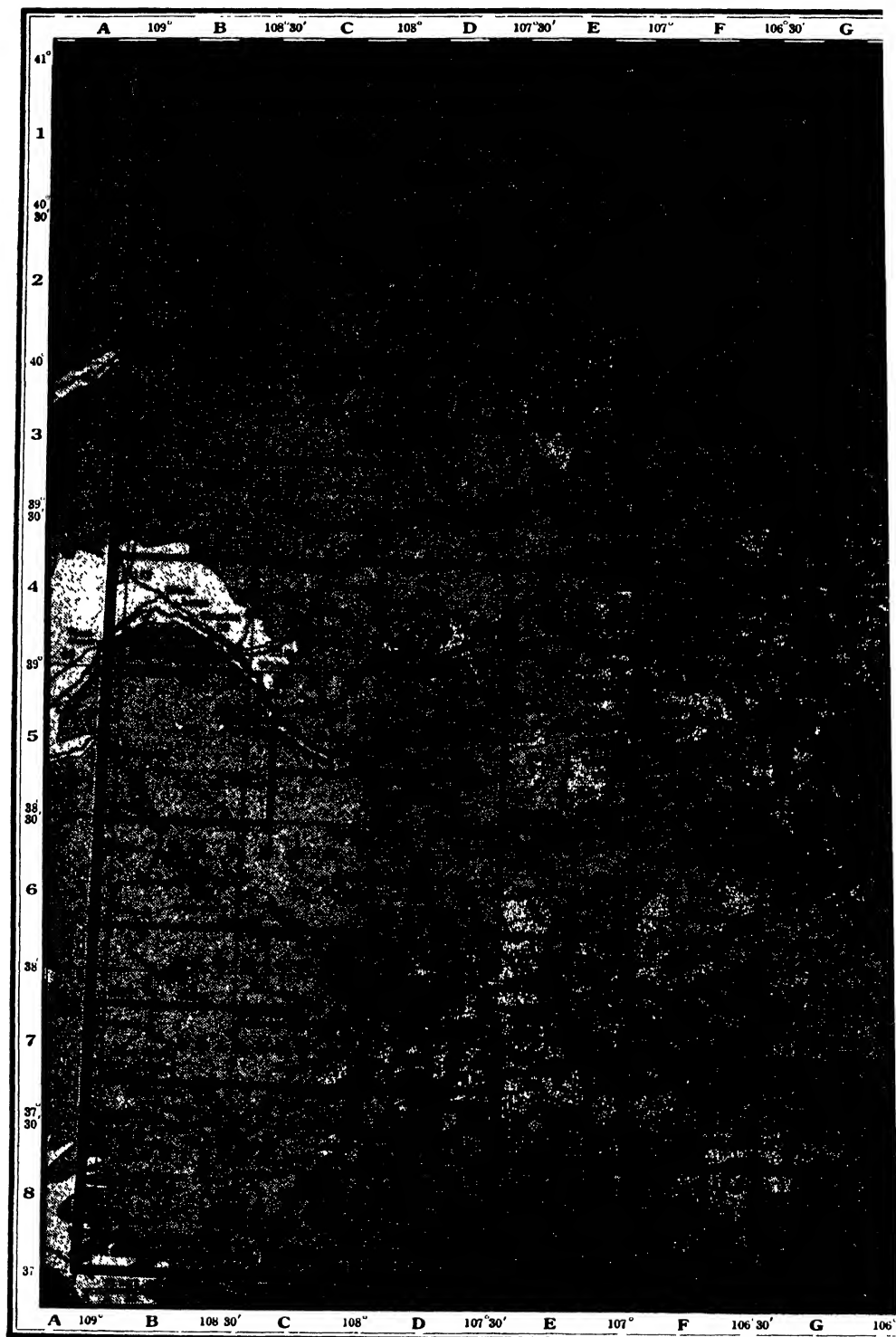
COLORADO

Agate, (M4).....	150	Crestone, (H6).....	74	Gunnison, (E5) ...	1,329	Milliken, (K2).....	372	San Luis, (J8).....	900
Agular, (K8).....	1,236	Cripple Creek, (J5)	2,325	Gypsum, (F3)....	164	Minturn, (G3).....	298	San Pablo, (J8)...	500
Akron, (N2).....	1,401	Crook, (O1).....	232	Hartman, (P6)....	175	Mirage, (H6).....	120	San Rafael, (G8)...	293
Alamosa, (H8)...	3,171	Crowley, (M6)...	224	Hastings, (K8)...	587	Moffat, (H6)....	200	Sargents, (G6)....	100
Allison, (D8)....	120	Dacono, (K2)....	172	Haswell, (N6)....	250	Mogote, (G8)....	350	Sawpit, (C7).....	121
Alma, (G4).....	127	De Beque, (C4)...	292	Haxtun, (O1)....	1,118	Monte Vista, (G7)	2,484	Sedalia, (K4)....	100
Amherst, (P1)...	100	Deertrail, (L3)...	500	Hayden, (E2)....	455	Montezuma, (H3)	69	Sedgewick, (O1)...	380
Amity, (P6)....	100	Delagua, (K8)...	1,035	Henderson, (K3)...	250	Montrose, (D6)...	3,581	Segundo, (K8)...	520
Animas City, (D8)	250	Del Norte, (G7)...	1,007	Hesperus, (C8)...	200	Monument, (K5)...	192	Seibert, (O4)....	311
Antlers, (D3)...	120	Delta, (C5).....	2,623	Higbee, (M8)....	170	Mosca, (H6)....	150	Severance, (K1)...	200
Antonito, (H8)...	946	DENVER, (J3)....	256,491	Hillrose, (N2)...	250	Mountain View, (K5)	372	Sheridan Lake, (P5)	100
Arapahoe, (P5)...	150	Dillon, (G3)....	126	Hoehe, (L8)....	100	Mount Harris, (E2)	800	Silam, (J6).....	150
Arlington, (N6)...	100	Divide, (J5)....	150	Holly, (P6)....	940	Mount Morrison, (J3)	195	Silt, (I3).....	165
Arriba, (N4)....	334	Dolores, (C7)...	465	Holyoke, (P1)...	1,205	Naturita, (H6)....	200	Silver Cliff, (J6)...	241
Arvada, (J3)....	915	Doyleville, (F6)...	150	Hooper, (H6)....	156	Nederland, (H3)...	291	Silver Plume, (H3)	272
Aspen, (F4)....	1,265	Dunton, (C7)...	100	Hotchkiss, (D5)...	572	New Castle, (E3)...	447	Silverton, (D7)...	1,150
Atchee, (B3)....	120	Durango, (D8)...	4,116	Hot Sulphur Springs, (G2).....	123	New Raymer, (M1)	267	Simla, (L4)....	387
Atwood, (N1)...	350	Eads, (O5).....	406	Howard, (H6)....	170	Norwood, (C6)...	365	Smuggler, (D7)...	700
Ault, (K1).....	769	Eagle, (F3)....	358	Howardville, (D7)	100	Nucla, (B6)....	217	Snyder, (M2)....	100
Aurora, (K3)....	983	East Canon, (J6)...	445	Hoyt, (L2).....	100	Nunn, (K1).....	149	Somerset, (E5)...	450
Austin, (D5)....	150	Eastlake, (K3)...	100	Hudson, (K2)....	322	Oak Creek, (F2)...	967	Sopris, (K8)....	1,000
Avondale, (L6)...	700	East Portal, (H3)...	300	Hugo, (N4).....	838	Oakview, (J7)...	250	South Canon, (F7)	1,281
Basalt, (F4)....	185	Eaton, (K1)....	1,289	Husted, (K5)....	100	Ohio City, (F5)...	50	South Fork, (J6)...	150
Bayfield, (D8)...	267	Eckert, (C5)....	100	Hygiene, (J2)...	332	Olathe, (D5)....	491	Springfield, (O8)...	295
Bellvue, (J1)...	300	Eckley, (F2)....	354	Idaho Springs, (J3)	1,192	Olney Springs, (M6)	240	Starkville, (L8)...	1,200
Bennett, (L3)...	100	Edgewater, (J3)...	660	Ideal, (K7).....	300	Ophir, (H7)....	29	Steamboat Springs, (F1).....	1,249
Berthoud, (J2)...	852	Elbert, (K3)....	350	Ignacio, (D8)...	290	Orchard, (L2)....	531	Sterling, (N1)...	6,415
Berwind, (K8)...	500	Eldora, (H3)....	35	Iliff, (O1).....	218	Orlway, (M6)....	1,186	Stoneham, (M1)...	200
Beulah, (K6)....	250	Elizabeth, (L4)...	230	Irnton, (D7)....	73	Ortiz, (G8)....	250	Stonington, (P8)...	100
Blackhawk, (J3)...	253	Elkton, (J5)....	200	Jamestown, (J2)...	150	Otus, (D2).....	467	Strasburg, (L3)...	200
Blanca, (H8)....	380	El Moro, (L8)...	105	Jaroso, (H8)....	200	Ovid, (P1).....	100	Stratton, (O4)...	421
Bonanza, (G6)...	90	Empire, (H3)....	4,356	Johnstown, (K2)...	274	Pagosa Junction, (E8).....	100	Strong, (K7)....	200
Boone, (L6)....	261	Englewood, (K3)...	697	Julesburg, (P1)...	1,320	Pagosa Springs, (E8).....	1,032	Strontia Springs, (J4)	150
Boulder, (J2)...	11,006	Erie, (K2).....	400	Keenesburg, (L2)...	164	Palmer Lake, (K5)	100	Sugar City, (M6)...	836
Rowie, (D5)....	300	Espinosa, (H8)...	450	Kenwood, (J6)...	100	Pallade, (C4)....	855	Superior, (J3)...	233
Brandon, (P6)...	200	Estes Park, (J2)...	160	Keota, (L1)....	129	Panaja, (D5)....	925	Swink, (M7)....	465
Branson, (M8)...	200	Eureka, (D7)....	505	Kersey, (K2)....	319	Palmer Lake, (K5)	160	Telluride, (D7)...	1,618
Breckenridge, (G3)	796	Evans, (K2)....	183	Kiowa, (L4)....	148	Paonia, (D5)....	925	Tercio, (J8)....	100
Briggsdale, (L1)...	200	Fair Play, (G4)...	214	Kit Carson, (O5)...	150	Parker, (K3)....	100	Thatcher, (L7)...	100
Brighton, (K3)...	2,715	Firestone, (J2)...	544	Kokomo, (G4)...	93	Parlin, (F6)....	254	Tiffany, (O8)...	250
Bristol, (P6)....	300	Flagler, (N4)....	518	Kremmling, (F2)...	1,815	Pierce, (N1)....	322	Tioga, (K7)....	150
Brookside, (J6)...	202	Fleming, (O1)...	2,619	Lafayette, (J2)...	200	Penrose, (K6)...	150	Timpas, (M7)...	200
Brush, (M2)....	2,103	Florence, (J6)...	48	Laird, (P2)....	521	Pierce, (K1)....	327	Tioga, (K7)....	250
Buena Vista, (G5)	903	Florissant, (J5)...	300	La Jara, (G8)....	4,964	Pine, (J4).....	100	Tolland, (J3)...	100
Buffalo Creek, (J4)	150	Forbes, (K8)....	8,755	La Junta, (N7)...	317	Pinon, (K6)....	100	Towner, (P5)...	150
Burlington, (P4)...	991	Fort Collins, (J1)...	350	Lamar, (O6)....	2,512	Pitkin, (F5)....	165	Trinchera, (L8)...	100
Byers, (L3)....	250	Fort Garland, (J8)...	1,014	Laporte, (J1)....	100	Placerville, (D6)...	150	Trinidad, (L8)...	10,906
Calcite, (H6)....	200	Fort Logan, (J3)...	3,818	Larkspur, (K4)...	100	Plateau City, (C4)...	100	Troy, (N8).....	400
Calhan, (L4)....	380	Fort Lupton, (K2)...	595	La Salle, (K2)...	460	Platner, (N2)...	100	Two Buttes, (P7)...	93
Canon City, (J5)...	4,551	Fort Morgan, (M2)...	1,062	Las Animas, (N7)...	2,252	Platteville, (K2)...	479	Valdez, (K8)...	250
Capulin, (G8)...	800	Fountain, (K5)...	361	Lasauces, (H8)...	140	Poncha Springs, (G5)	37	Vernon, (P3)...	120
Carbondale, (E4)...	310	Fowler, (L6)....	81	Lasauces, (H8)...	737	Portland, (K6)...	473	Victor, (J5)....	1,777
Carr, (K1).....	150	Frederick, (K2)...	1,193	La Veta, (K8)....	100	Pueblo, (K6)....	43,050	Villagrove, (G6)...	100
Castle Rock, (L4)...	461	Frisco, (G3)....	100	Lawson, (H3)...	100	Ramah, (K4)....	200	Vona, (O4)....	268
Cedaredge, (D5)...	455	Fruita, (B4)....	200	Lazer, (D5)....	4,959	Rapson, (K8)...	150	Walden, (G1)...	260
Center, (G7)....	547	Galeton, (L1)....	200	Leadville, (G4)...	250	Ravenwood, (K7)	200	Walsenburg, (K7)...	3,565
Central City, (J3)...	552	Gardner, (J7)....	200	Lime, (K6)....	1,047	Redcliff, (G4)...	347	Ward, (H2)....	74
Chandler, (J6)...	400	Gary, (M2)....	703	Limon, (M4)....	1,636	Redvale, (C6)....	100	Wellton, (M2)...	100
Cheraw, (M6)....	186	Genoa, (N4)....	222	Littleton, (K3)...	200	Rico, (D7)....	326	Wellington, (K1)...	439
Cheyenne Wells, (P5)	508	Georgetown, (H3)...	200	Loma, (B4)....	5,848	Ridgway, (D6)...	400	Westcliffe, (H6)...	338
Clifton, (C4)....	300	Gilcrest, (K2)...	200	Louisville, (J3)...	1,799	Rifle, (F3)....	885	Westminster, (J3)...	235
Coal Creek, (J6)...	618	Gilman, (G3)....	2,073	Louviers, (K4)...	300	Rockvale, (J6)...	1,249	Weston, (K8)....	600
Coal Dale, (H6)...	100	Glenwood Springs, (E3).....	2,484	Loveland, (J2)...	5,065	Rocky Ford, (M7)...	3,746	Wetmore, (J6)...	100
Coalmont, (F1)...	250	Golden, (J3)....	633	Lyons, (J2)....	570	Roggen, (L2)...	150	Whitewater, (C4)...	150
Cokedale, (K8)...	500	Goldfield, (J5)...	308	McGregor, (E2)...	220	Romeo, (G8)...	200	Wiggins, (M2)...	200
Colbran, (D4)....	286	Granada, (P6)...	32	Manassa, (H8)...	906	Rosita, (J6)....	45	Wild Horse, (O5)...	100
Colorado Springs, (K5).....	30,105	Granby, (H2)....	8,665	Mancos, (C8)....	682	Roswell, (K5)...	350	Wiley, (O6)....	565
Como, (O4)....	121	Grand Junction, (B4).....	150	Manitou, (J5)...	1,129	Rouse, (K8)....	550	Williamsburg, (J6)	402
Concrete, (K6)...	250	Grandlake, (H2)...	228	Manzanola, (M6)...	562	Russell, (J7)...	120	Windsor, (J2)...	1,290
Conjos, (C8)....	300	Grand Valley, (C4)...	10,958	Marble, (F4)....	81	Russell Gulch, (H3)	200	Wolcott, (F3)...	100
Cortez, (B8)....	541	Green Mountain, (K2)...	100	Matheson, (L4)...	200	Rye, (K7)....	250	Woodland Park, (J4)	125
Cotopaxi, (H6)...	120	Greene, (J5)....	100	Mead, (K2)....	145	Saguache, (G6)...	948	Wray, (P2)....	1,538
Craig, (D1)....	1,297	Falls, (J5)....	195	Meeker, (D2)...	935	Salida, (H5)....	4,689	Yampa, (F2)....	200
Crawford, (D5)...	149	Guffey, (H5)....	42	Merino, (N2)...	263	San Acacio, (H8)...	100	Yuma, (O2)....	1,177
Creede, (F7)....	500			Mesa, (C4)....	200	Sanford, (H8)....	555		
Crested Butte, (F5)	1,213								

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RADO



leys, and only the snowy patches in the deep ravines on the high mountains remind us of the immense ice fields of long ago.

Scenic Wonders. To the traveler who enters the state from the east, beauty is not at once evident. All about him are treeless plains, covered with the dusty, bedraggled sagebrush—mile after mile; but presently, to the west, the mountains, so hazy and distant at first as to look almost like cloud heaps, come into view, and from that time there is an ever-changing panorama. Snow-crowned peaks are everywhere to be seen, standing out clear above the purple-blue ridges, and at every turn there are new aspects and new beauties. Up and up the roads lead, in zigzag fashion; a train needs at times four engines to pull it up the steep slopes. The way lies through gorges, down which a white-foaming river rushes, and over lofty passes which open up marvelous views of range beyond range, until the eye almost wearies of so much grandeur and sublimity.

Time was when the mountain region of Colorado was the home of numerous wild animals, but to-day these are to be found only in the more inaccessible spots. Bears, wolves, mountain sheep and goats, and wild cats still range there, and in the streams the beavers fashion their dams. These mountain streams swarm with trout, and are favorite resorts of fishermen.

Rocky Mountain National Park has a greater number of visitors, probably, than any other national park. Mesa Verde National Park attracts many visitors to its interesting ruins of ancient Cliff Dwellers' villages (see MESA). Hovenweep National Monument contains a similar group of ruins. The other two national monuments, Colorado and Wheeler, are especially noted for their curious and picturesque rock formations.

The recent discovery and unearthing of the mammoth petrified trees and stumps in the New Petrified Forest has added a distinctly different attraction to those of the Pike's Peak region, famous for its unsurpassed mountain scenery and healthful climate. The New Petrified Forest is in the heart of the Rocky Mountains, to the west of Colorado Springs. Scientists state that this great forest has lain buried in a volcanic lava bed for thousands of

years, and pronounce it to be of the redwood, or sequoia, variety, like the redwood trees now growing in California. The forest grew in disintegrated lava, was covered later by a second lava flow, and petrified at still a later date. There are huge petrified specimens in the New Forest. One of the petrified stumps weighs 70 tons, is 17½ feet in diameter, and 10½ feet high; many other specimens are almost as large.

Flora. Next to the magnificent scenery, the chief attraction of the mountains lies in the beauty and profusion of their wild flowers. The wide range of altitude gives a diversity of climate comparable to many degrees of latitude, and a varied and extensive flora, which is exceeded by only one other state in the Union—California. There are more than 3,000 species, ranging from an arctic, alpine flora, and certain species common to the far North within the Arctic Circle, to representatives of the Mexican flora, on the southern border of the state.

No other flower attracts more attention than the blue columbine. It is the state flower, selected by the school children by an overwhelming majority, and approved by the state legislature.

Climate. The climate is usually delightful, the air is dry, and the sunshine is abundant. Rain falls throughout the warm parts of the year, and snows occur in winter, but both are moderate in quantity. The altitude and dryness minimize the heat in summer and the cold in winter. The perpetual snow line varies between 13,000 and 14,000 feet, except on the side of the mountains sloping toward the north and in deep canyons, where it is considerably lower. Colorado has a mean annual rainfall of 14.8 inches, and it is distributed quite generally throughout the state, though it is heaviest in the mountains. In summer time, the days are frequently hot, but the nights are cool and bracing. At Denver, the mean temperature in January is 28.2°, and in July 71.8°. Height and dryness are the factors which account for the coolness of the shade and for the rapid fall in temperature as night comes on, for rarefied air without moisture does not hold heat as does a moister, denser atmosphere, such as prevails in many states.

Sources of Colorado's Wealth

Agriculture. An industry which has had a rapid growth is agriculture, which has passed all other industries in value. Naturally, in a state so mountainous, there is much land that is not available for crops, but the lack of rainfall has been an even greater drawback than the mountains. The development of crops peculiarly adapted to semi-arid regions has made the dry-land farm area several times

greater than the irrigated area. Irrigation, however, has developed amazingly in recent years, and everywhere throughout the state are to be seen the great fields with their growing crops and the little irrigation ditches between the rows. Colorado, with over 3,000,000 acres irrigated, is second among the states in irrigation. The mountain streams are utilized, and the naturally fertile soil is rendered very

productive. Over 33,000,000 acres are now in farms, though less than one-fourth of this area is actually cultivated.

Sugar beets, wheat, hay, potatoes, and corn are usually the chief crops, and they vary in rank and value according to the crop or market prices. The sugar-beet industry has grown rapidly, and the state has vast refineries in which hundreds of thousands of tons of beet sugar are made each year—more than in any other state, and more than one-third of the output of the entire country. By-products of the industry, the pulp, tops, molasses, etc., are of great value as a feed for livestock; the number of animals now served by one large company alone, not counting the other companies, is two million sheep and several hundred thousand cattle. While potash and a number of rare chemicals can also be obtained from the waste of the sugar factories, this is as yet economically unimportant. Further efficiency is practiced by one large company, in a plant which makes white granulated sugar from the waste molasses, which was hitherto fit only for livestock food.

Colorado potatoes, especially those grown in the region around Greeley, Carbondale, and Monte Vista, are famous for their quality. The mountain valleys seem remarkably well adapted to the growing of fruits, and apples, peaches, plums, pears, and cherries are produced. Most widely famous of all the products of these regions, however, are the Rocky Ford cantaloupes, of which hundreds of carloads are shipped each year. A new crop which is being grown successfully in the high mountain-park regions is lettuce.

It might be expected that the large increase in mixed farming would lead to a decrease in stock-raising, the oldest agricultural industry in the state, but such has not been the case. The cattle ranges are not to-day so large as formerly, but the stock is better bred and better cared for; stock cattle and sheep are decreasing, but dairy cattle and swine are increasing. Much land that is still too dry for growing crops affords excellent grazing, and cattle and sheep seem to find the dried grass of the plains quite to their liking in the winter, even when the light snow has sifted over it. Over fifty-seven per cent of the farm land of the state is used for grazing.

Forests. The mountains do not suffer as do the lowlands from a dearth of trees. Most of them are wooded well up toward the snow line with pines and other cone-bearing trees, and the lumber products of these high regions are of considerable importance. But in many places it has been estimated that the trees are of more benefit standing than in the form of lumber, for since they grow all about the river sources, they do much to protect the drainage basins, preventing serious floods as well as conserving

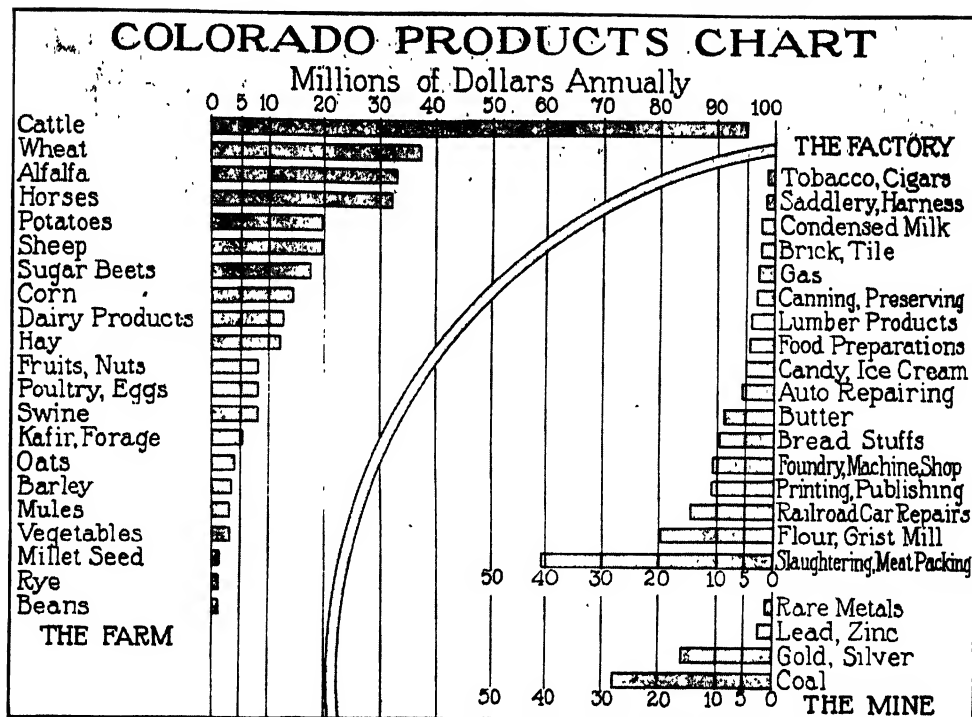
moisture and equalizing the distribution of rainfall. The Federal government, therefore, has established a number of national forests, and in those sections lumber-cutting is permitted only under strict supervision.

Of the national forests in the United States, fifteen lie wholly and two partly within the state of Colorado. The total area within these forests and within the borders of the state is 14,748,143 acres. A considerable amount of land within the forest boundaries has passed into private ownership, or has been otherwise withdrawn from the forest area, under the provisions of the various acts of Congress relating to the national forests, leaving a total net national forest area for the state of 13,290,354 acres.

Mineral Resources. The development of its mineral resources is one of Colorado's chief industries, and was for a time almost its only industry. Even now, after over fifty years of mining activity, it is impossible to estimate the wealth of minerals hidden in its mountains. However, it is not first among the states in mineral production, for fourteen others usually rank ahead of it; nor is it at the head of the list in the output of any minerals except radium, uranium, and vanadium. Its gold production, which at the beginning of the century was twice as great as that of any other state in the Union, has been exceeded by that of California, and averages only about \$7,000,000 a year, as against the \$30,000,000 of an earlier date.

Colorado ranks usually seventh in silver production, and fifth in the production of lead and zinc. Proved areas of oil and gas are being developed with rapidity, and production on public lands has jumped from 7,000 barrels in 1921-1922 to more than 700,000 barrels. The oil shale deposits of the Grand Valley and De Beque areas are the richest in the world, with the exception of the Torbante in Australia. Eight of the largest oil companies in the world are operating in this area. Colorado was the second state to produce oil.

First in importance is coal production, in which Colorado has for many years surpassed any other state west of the Mississippi River. Most of the 10,000,000 tons mined each year is bituminous of various grades, but the state ranks next to Pennsylvania in the production of anthracite. Gold, lead, zinc, and silver, in that order, are next in rank; copper and iron ore are present also. Rarer metals, as tungsten, uranium, and manganese, are found in paying quantities. Special attention was attracted to the Paradox Valley of Colorado and Utah because of the discovery there of the radium-bearing mineral carnotite, which is a uranium ore (see RADIUM). Sandstone, granite, marble, onyx, limestone, brick clay, and kaolin are quarried.



THE FIGURES REPRESENT AVERAGE PRODUCTION OVER A PERIOD OF FOUR YEARS

Manufactures. A state with such remarkable mineral resources, and especially with such inexhaustible coal beds, is certain to have extensive manufactures, and Colorado has become one of the chief manufacturing states west of the Mississippi. Many of the manufactures grew directly out of mining; smelting of ore and refining of metals are now industries of huge proportions. The stock-raising industry opened the way for the important slaughtering and meat-packing business, which is usually first in factory values in the state.

First place in manufacturing is given, however, to the production of beet sugar, in which Colorado surpasses all the states.

The railroads brought into being great steel mills and railroad repair shops. Colorado ranks fourth among the states in the production of mining machinery.

Transportation. When rumors of gold deposits lured people to Colorado in 1859, there were many forms of transportation. Ox carts were most favored, because the oxen could live on grass more easily than cereal-fed horses. Some pioneers rode on horseback; some walked, pushing their provisions in hand carts. In mule-drawn wagons, occasionally, family parties might have been seen, their chickens swinging in baskets on the side of the wagon; often a gaunt cow was tied to the rear. A spring wagon with a large sail careened merrily over the

plains before a fine breeze, but, becalmed, was passed by a slower-moving procession of white covered wagons, many bearing the historic motto, "Pike's Peak or Bust."

Transportation in Colorado to-day is chiefly by rail, since the rivers are not navigable, and Colorado is better supplied with railroads than is any other mountain state. To say that Colorado has over 5,000 miles of railway tells but inadequately the transportation story, for the building of much of it has been a matter to try men's souls. The rocks had to be blasted out and leveled down; the chasms spanned by bridges that look frail but will not tremble as the heaviest express trains thunder over them; the persistent upgrade conquered by means of sharp zigzags that climb little by little to the pass, in some places 11,000 feet in altitude, from which is begun the apparently perilous descent on the other side. On the way to Cripple Creek, for instance, the town comes into view, lying in its mountain hollow, almost an hour before the train draws in to its station, and all that time is spent in making the descent by a series of "loops," made necessary by the steep grades. Not only money, but energy, courage, and life have been spent to build the various roads over the mountains. The most recent engineering achievement is the Moffatt Tunnel, fifty miles west of Denver, by means of which heavy grades over the Divide were

eliminated, and the distance from Denver to the Pacific coast shortened about 175 miles.

The chief roads of the state are the Atchison, Topeka & Santa Fe; the Chicago, Burlington & Quincy; the Missouri Pacific; the Denver & Salt Lake; the Colorado & Southern; the Chicago, Rock Island & Pacific; the Rio Grande Southern; the Union Pacific; and the Denver &

Rio Grande. The last-named has the greatest mileage of any road within the state; part of its way lies through the Royal Gorge. The Rock Island runs parallel for many miles to the trail over which the hostile Cheyenne and Arapahoe Indians came in from the plains on their raids in 1868. Many of the railroads follow old trapper trails across the state.

Government and History

Government. In the first few years of Colorado's history, legislation and government consisted chiefly of people's courts and claim clubs, the latter instituted to register and protect mining claims, the former to keep order and administer justice. An interesting picture of the early lawmakers is quoted by Irving Howbert in his *Memories of a Life Time in the Pike's Peak Region*:

A more unique gathering together of a legislative assembly probably never before presented a subject for chronicle. They came in wagons, ambulances, on horseback, and on foot. George Crocker and his fellow member from California Gulch footed it all the way over the snowy range—one hundred forty miles. He (Crocker) had been mining, and he possessed no other clothes than those he wore at his sluice box in the gulch. His face was blackened by the smoke of the campfire, his eyes hollow with fatigue and hunger, hair tangled, and beard yellow with dust; this was a picture of a statesman of the new West. The next day we elected this George Crocker speaker of the house, and his speech on taking the chair would have done credit to polished oratory, to a Massachusetts Cicero.

The constitution under which Colorado is governed dates from 1876, the year of its admission to statehood. Of the amendments added since that time, the most important is the one passed in 1893 by which women were permitted to vote on equal terms with men, long in advance of the Federal Amendment. They were also allowed to hold any office, and have been frequently elected to the legislature. In 1912 another important amendment was added, providing for the recall of all elective officers (see RECALL). An amendment in effect January 1, 1916, prohibited the shipment of liquor either into the state or within the state, thus insuring statewide prohibition before the passage of the national prohibition amendment.

The executive department of the state consists of the governor, lieutenant-governor, secretary, auditor, treasurer, attorney-general, and superintendent of public instruction, each elected for two years. Any of these except the treasurer and the auditor may succeed himself. The legislature consists of the usual two houses; it meets every other year. There are thirty-five senators, holding office for four years, and sixty-five representatives, holding office for two years. By the constitution, the com-

bined membership of the two houses may never exceed one hundred. The judiciary of the state includes a supreme court of seven members, each elected for ten years; district courts, county courts, and justice courts.

An interesting feature of the local government is the right which cities and towns have to establish the city-manager form of government; a number of towns, including Boulder, Grand Junction, and Colorado Springs, three of the large cities in the state, are under this form. See CITY MANAGER.

History. Long ago, before ever a white man entered the state, the Cliff Dwellers and their probable descendants, the Pueblo Indians, lived in the southwestern part, and the second largest city, Pueblo, has taken its name from them. Some of the Spanish adventurers visited the territory in the sixteenth century, but not finding the abundant wealth of which they were in search, they made no settlements. In 1776, a Spanish expedition headed by Escalante explored the southwestern corner and traced certain river courses, but again no attempt at settlement was made. Their influence is seen in the colorful Spanish names for rivers and mountains, such as the San Juan and Sangre de Christo ranges, Las Animas and Rio Grande de Norte rivers, while all the southern counties of the state, with few exceptions, have Spanish names.

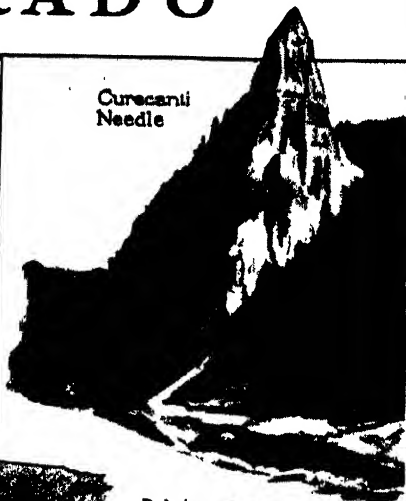
The Louisiana Purchase (1803) brought part of the territory into the possession of the United States, and three years later, Captain Zebulon Pike, for whom the state's famous peak was named, made notable explorations. In 1820 Long, and in 1842 and 1844 Fremont, visited the region and carried back further information concerning it, but it was still a practically unknown wilderness, inhabited by Indians and a very few traders, who were attracted by the wealth of furs. Partially from Texas and partially from Mexico, the United States obtained the remainder of the territory in 1848.

Beginnings of Growth. Gold was first discovered in Colorado in 1849, but it was not until late in 1858 that a small party of prospectors settled at the mouth of Cherry Creek and began a settlement which was later called Denver. In 1859 the rush of immigration began. It was not so spectacular as was the

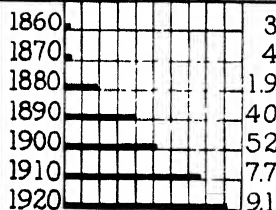
COLORADO



State Capitol



Curecanti Needle

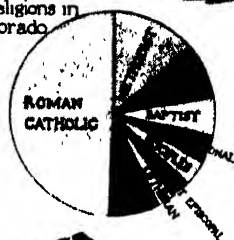


People per square mile, by decades



Location among the states

Religions in Colorado



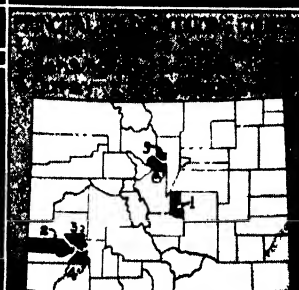
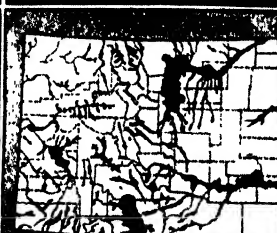
Cliff dwelling, beneath overhanging ledge



Mount of the Holy Cross

INHABITANTS PER SQUARE MILE

☐ Fewer than 2
☐ 2 to 6
☐ 6 to 10
☐ 10 to 15
☐ 15 to 20
☐ 20 to 25
☐ 25 to 30
☐ 30 to 35
☐ 35 to 40
☐ 40 to 45
☐ 45 to 50
☐ 50 to 55
☐ 55 to 60
☐ 60 to 65
☐ 65 to 70
☐ 70 to 75
☐ 75 to 80
☐ 80 to 85
☐ 85 to 90
☐ 90 to 95
☐ 95 to 100



RESEARCH QUESTIONS ON COLORADO

(An Outline suitable for Colorado will be found with the article "State")

Where is Estes Park?

What was the first educational institution of high rank in Colorado?

Is Pike's Peak difficult of ascent?

What advantages have accrued from the construction of the Moffatt Tunnel?

What is particularly impressive about the Royal Gorge?

What is the botanical name of the state flower?

What is Colorado's place among the states in the sugar-beet industry?

What and where is the Garden of the Gods?

Does the provision calling for the recall of state officers extend to the judicial officers?

What is true as to the area in lakes in Colorado?

What does the word *mesa* mean, and why is it appropriate?

Why was the discovery of carnotite in Colorado of importance to everyone in the United States?

How does Colorado's foreign population compare with that of its neighbor on the south, New Mexico?

Was Pike's Peak named for the first man who ascended it?

Do the names of counties, rivers, and mountains tell anything about the early inhabitants and explorers of Colorado?

How did Colorado rank at the close of the nineteenth century as regards the production of gold, and what change has taken place since then?

How does the state rank among the mountain states with reference to railroad mileage?

Why has the extension of railroads been more of an achievement in Colorado than in Illinois or Iowa?

What does the name of this state mean?

What primitive inhabitants of the state are commemorated in the name of the second largest city?

What are the mountain "parks"? Have they any importance except as summer resorts?

Is the most famous mountain peak of the state also the highest?

Why is it that even during the summer months, when the days are very hot, the nights are almost invariably cool?

How has the spread of irrigation and the consequent increase in mixed farming affected the livestock industry?

What states have an average elevation greater than that of Colorado?

What famous product of this state finds its way to the breakfast tables of people throughout the country?

Name three important amendments to the state constitution, and tell when they were passed.

Why is the Mount of the Holy Cross so named?

What part do the rivers play in making this state one of the most famous scenic regions in the world?

What part have these rapid mountain torrents, which are of no use for navigation, had in the industrial development of the state?

How does Colorado rank among the states as regards density of population?

What inducements has the mountain region to offer to sportsmen?

Name two manufacturing industries that have grown out of mining, and two that have grown out of some phase of agriculture.

How does Colorado rank among Western states with reference to coal production?

movement of a decade earlier toward California, but it reproduced many of the same conditions. Rough mining towns sprang up, out of which grew the cities of Colorado Springs, Boulder, and Golden, and there was an immediate movement toward organization, which took no notice of the fact that the territory was supposed to belong to Kansas. In 1861 the Territory of Colorado was organized, with an area somewhat greater than that of the present state, and agitation for admission to statehood began. The early settlers had considerable trouble with the Indians, and many a battle took place with the Cheyenne and the Arapahoe between 1864 and 1870.

Years of Statehood. In 1864 and again in 1868, vain efforts were made toward state organization, but in 1875 the Federal Congress finally passed an enabling act. It was intended that admission to the Union should take place on July 4, 1876, but the preliminaries were delayed somewhat, and the final proclamation was not made until August 1 of that year. Colorado, however, bears the popular name of Centennial State.

A period of depression began soon after that date, as it became evident that the supply of gold was not inexhaustible. One mining town after another was deserted, and there are still to be found in the mountain regions these "ghost towns" which were once the scene of hopes and fears, feverish exultation and despair. But other resources were at hand, as soon as men could free their minds from the idea that gold alone was worth striving for. Silver and lead were soon found in large quantities, the possibilities of the vast grassy plains and grazing lands became evident, and the soil called for irrigation. So the real industrial development of the state began, and has gone on steadily ever since.

Labor Troubles. These have constituted one of the serious obstacles that Colorado has had to face. In 1894, 1896, and 1904, strikes occurred among the metal miners, that of 1904 being particularly critical and resulting in considerable loss of life. Late in 1913, another strike began, this time among the coal miners, which had very serious consequences, and was finally controlled by Federal troops sent to the state by President Wilson.

In 1919 the state adopted the budget plan, and the first budget was presented to the legislature in 1921. In 1923 the State Rangers were disbanded. The completion of the Moffatt Tunnel (see *Transportation*, above) was the outstanding event of 1927.

K.L.C.

Other Items of Interest. The blue spruce, which grows everywhere in the Colorado Rockies, has been chosen as the state tree. Dr. James, the botanist of Long's expedition, found while crossing the Divide, the columbine, *Aquilegia caerulea*, a flower hitherto

unknown in American flora. It was, therefore, a natural choice for Colorado's state flower.

In 1858 a group of miners built for themselves near the foot of the Rockies some rude cabins of cottonwood logs. This was the beginning of Denver.

One of the most beautiful of the mountain "parks" of Colorado is Estes Park, a favorite resort site which is rendered picturesque by the Big Thompson Creek.

At Morrison, a village not far from Denver, was excavated the skeleton of a prehistoric reptile, or dinosaur, eighty feet in length.

At Cripple Creek, over nine thousand feet above sea level, the temperature falls to the freezing point nearly every night in July.

Such names as Arapahoe, Cheyenne, Manitou, Kiowa, Ouray, Saguache, and Yampa are reminiscent of the time, little more than a generation ago, when Indians in great number roamed the prairies and the mountain country of Colorado.

One of the most famous peaks in the state is the Mount of the Holy Cross. High on its side, two deep, snow-filled gullies cut each other at right angles, making a very distinct white cross.

There are within the state at least fifteen mountain passes which are over 10,000 feet above sea level.

The first information about the discovery of placer gold in Colorado was brought by Cherokee Indians returning from California to Kansas City. These Indians had become familiar with gold-mining in Georgia before they were removed from there to the Indian Territory.

Lon Chaney, moving-picture actor, was once a stage hand in the first theater in Colorado Springs.

Related Subjects. The following articles in these volumes will make clearer certain phases of the geography and the industrial life of Colorado

CITIES AND TOWNS

In addition to the two cities named, see other descriptions on back of state map

Denver	Pueblo
LEADING PRODUCTS	
Alfalfa	Potato
Beet	Radium
Cattle	Sheep
Coal	Silver
Corn	Tungsten
Gold	Uranium
Lead	Wheat
Muskmelon	Zinc
MOUNTAINS	
Pike's Peak	Rocky Mountains
RIVERS	
Arkansas	Platte
Colorado	Rio Grande
SCENIC FEATURES	
Garden of the Gods	Royal Gorge
UNCLASSIFIED	
Boulder Dam	Moffatt Tunnel
Columbine	Monuments, National
Forests and Forestry	Parks, National
Mesa	Pike, Zebulon

COLORADO BEETLE. See POTATO BUG; BEETLE.

COLORADO COLLEGE. See COLORADO (Education).

COLORADO MONUMENT. See MONUMENTS, NATIONAL.

COLORADO RIVER, a famous river of the Southwestern United States, which flows

through a region remarkable not only for its magnificent scenery, but also because it affords a striking illustration of the mighty force of wind and water in changing the contour of the land. This stream, full of waterfalls and chasms, cuts through Northern Arizona on its



THE COLORADO RIVER

way to the sea through one of the most wonderful gorges in the world (see GRAND CANYON OF THE COLORADO). Working its way, century after century, through hard layers of rock, slowly deepening its channel by the grinding action of its pebbles, and aided by the gradual elevation of the whole plateau, this great architect of nature has cut a mighty gash in the bosom of the earth, from the top of which it gleams like a winding silver ribbon, a mile below.

The Colorado River has its source in Colorado state and is met by one of its chief tributaries, the Green River, in Southeastern Utah. Until recently, it was declared that the Colorado was formed by the junction of the Green and the Grand rivers, but the name Colorado, by act of Congress in 1921, was given to the part that was formerly the Grand; so the latter has become the upper course of the main stream, in name as well as in fact. From its junction with the Green, it flows southwesterly through Utah and into Arizona, then, abruptly turning to the left, swings westward through the Grand Canyon. A second abrupt turn, below its union with the Virgin River of Nevada, gives it a southward course, and it then flows as the boundary between Arizona on the one side and Nevada and California on the other, until it reaches the Mexican border. Passing through 450 miles of Mexican territory, it reaches the Gulf of California about 2,000 miles from the headwaters.

The area drained by the Colorado and its tributaries is about 225,000 square miles. It is

a river of great variations in descent, width, and depth. In some rocky places it is scarcely more than seventy-five feet wide, but in the open stretches and in the valley region of its lower course it broadens out to a distance of 1,300 feet or more. In May and June, floods cause the river to overflow its banks, and in the fertile valley near Yuma, Ariz., which is often inundated, it is sometimes called the "Nile of America." At an early day, the seven states of Wyoming, Utah, Colorado, Nevada, California, Arizona, and New Mexico will profit from a great irrigation dam in this stream. What is known as the Boulder Dam project was authorized by Congress in 1928 (see BOULDER DAM).

COLORADO RIVER, one of the most important rivers of Texas, which, with its tributaries, drains an area as large as the state of Tennessee. Rising in the west central part of the state, at the foot of the Great Plains, it flows southeasterly to the Gulf of Mexico and empties into Matagorda Bay, 900 miles from its source. The beautiful scenery of its valley and the deep canyons along its course make it one of the most picturesque streams of the state. Austin, the capital of Texas, is situated on the Colorado about 200 miles from its mouth. The river is not considered a navigable stream, except for a few flat-bottomed boats. It is an important source of water power and is used in irrigation along its southern course.

COLORADO SPRINGS, COLO. See COLORADO (back of map).

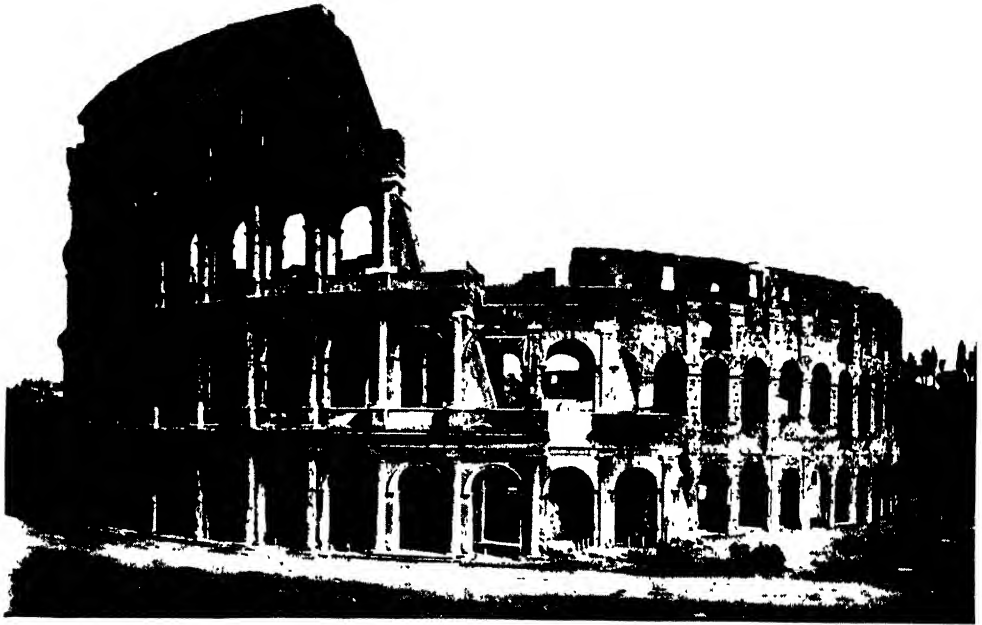
COLORADO WOMEN'S COLLEGE. See COLORADO (Education).

COLOR BLINDNESS. Some persons cannot distinguish between red and green, others between blue and yellow. There are some who can see no colors except black, white, and the grays. The condition causing these irregularities is called color blindness. It is generally congenital and it may be inherited. This means that most color-blind people are born that way. They never are able to distinguish colors. Some of them come of families in which the defect exists to an unusual degree. Color blindness may also be acquired. It is incurable; no glasses will correct it.

All railroads test the eyes of employees at regular intervals, in order to make certain that all operators can distinguish the color of signals. This testing is ordinarily done by having the employee pick out threads by colors. Since street and road lights are now used to guide traffic, all persons should be required to have themselves tested for color blindness as a measure of protection of themselves and others against accidents.

W.A.E.

COLORADO METHODIST EPISCOPAL CHURCH IN AMERICA, a branch of the African Methodist Churches (which see).



THE COLOSSEUM, OR FLAVIAN AMPHITHEATER (SEE, ALSO, PAGE 1566)

COLOR PHOTOGRAPHY. See PHOTOGRAPHY, subhead.

COLOR PRINTING. See PRINTING (Color Printing).

COLOSSEUM, *kol o se' um*, OR **COLISEUM**, a name applied to many modern places of amusement, but originally meaning the ancient Flavian Amphitheater in Rome, now one of the most famous ruins in the world. The name was derived from the colossal statue of Nero which stood near the amphitheater. That mammoth, unroofed building, a place of marble, ivory, gems, silks, and perfumed fountains, was for years the scene of combats between gladiators, fights of wild beasts, and persecution of Christians. It was begun by Vespasian and finished by Titus, A.D. 80.



APPROACH TO THE ARENA
Through the door the animals were driven, to kill and to be killed.

It was built in the form of an oval, about 615 feet long, 510 feet wide, and 160 feet high, and probably seated about 45,000 persons, though higher estimates have been given. The

flooring of the *arena*, or central space, was of boards covered with red sand, to soak up and conceal blood. A low wall enclosed the arena, and underneath were rooms for housing men and animals. Surrounding the arena were four tiers of marble seats for the spectators. Rows of columns, forming three series of arcades, decorated the exterior of the building, Doric on the first story, Ionic on the next, and Corinthian on the third (see COLUMN). The amphitheater remained almost uninjured down to the sixth century. Then, in the time of Theodoric and up to the eighteenth century, many pieces of marble were removed and used for other structures. In the eighteenth century, through the efforts of Pope Benedict XIV, it was saved from complete destruction, and although the ruins to-day show four stories on one side only, Byron's prophecy in *Childe Harold's Pilgrimage* may still hold true:

While stands the Coliseum, Rome shall stand;
When falls the Coliseum, Rome shall fall;
And when Rome falls—the world.

COLOSSUS, *ko los' us*, anything of gigantic size, but a name used especially in sculpture for a statue much larger than life-size. The bronze statue of *Liberty Enlightening the World*, in New York harbor, is the largest ever made. It is three times as high as the ancient *Colossus of Rhodes*, one of the seven wonders of the ancient world. The latter was a bronze figure representing Helios, the sun god, and is



Photo. U & U

Interior View. The ruins on the ground at the right show the old apartments for housing animals and attendants. (See *Colosseum*, page 1565.)

said to have stood astride the entrance of the harbor of Rhodes until destroyed by an earthquake and sold for old metal. Other modern colossi are the *Germania*, at Niederwald on the Rhine, and *Bavaria* at Munich.

The Egyptians furnished the earliest examples of colossal statuary. Among those are the wonderful colossi at Abu-Simbel of the great king Rameses II. Another one of interest, now preserved in the British Museum, is the human-faced Assyrian Winged Lion. But the most celebrated are those of Amenophis III, the head of one of which is displayed in the British Museum. That is the Memnon whose vocal powers were the fabled wonder of ancient times. It is now believed that the human tones which issued from this statue were due to the cracking of the stones when the morning sun warmed the dew-covered colossus.

The Greeks produced the most artistic colossi, such as the bronze statue of Pallas Athene on the Acropolis at Athens, the gold and ivory Athene in the Parthenon at Athens, and the Olympian Zeus. Following the Greeks, the Romans produced such gigantic statues as that of Jupiter on the Capitol and the 110-foot Nero, which suggested the name "Colosseum" for the near-by amphitheater.

Related Subjects. For illustrations of colossi, see *AS-SYRIA*; *LIBERTY*, *STATUE* OF. See, also, *SEVEN WONDERS OF THE WORLD*, *MEMNON*.

COLOSSUS OF RHODES. See *COLOSSUS*; *SEVEN WONDERS OF THE WORLD*.

COLT, SAMUEL, inventor of the revolver (which see); see, also, *CONNECTICUT* (Inventors and Their Inventions).

COLTSFOOT, a useful wild plant, native of Europe, but now found throughout the Northern and Middle United States and in Canada. It grows from downy seeds in the stiffest clay or in low, moist places. The light-yellow dandelion-like flowers appear on leafless stems in March or April, and are much sought by the bees. Toward noon, in the hot sunshine, the flowers close. The leaves do not appear until the flowers have died. The leaves are large and broad, five to eight inches long and three to six inches wide. They are attractively downy beneath; at first they are rounded, but later become heart-shaped, or like the foot of a colt. These leaves have been made into cigars, to be smoked in cases of asthma, and are still used for diseases of the lungs.

False coltsfoot is the wild ginger of the birthwort family (see *GINGER*), and the *beetleweed* of Southern mountains is often called coltsfoot. B.M.D.

Scientific Name. The coltsfoot belongs to the family *Compositae*. Its botanical name is *Tussilago farfara*.

COLT'S TAIL. See *FLEABANE*.

COLUMBA. See *MISSIONS AND MISSIONARIES*.

COLUMBIA, *ko lum' bi ah*, in the Canadian Rockies, the loftiest peak in Alberta, rising 12,740 feet above sea level. It lies just east of the British Columbia boundary, and is about 160 miles southwest of Edmonton and 100 miles northwest of Banff. Near it are the headwaters of the Athabaska and Saskatchewan rivers. See *ALBERTA*.

COLUMBIA, MO. See *MISSOURI* (back of map).

COLUMBIA, PA. See *PENNSYLVANIA* (back of map).

COLUMBIA, S. C., the capital of the state and the county seat of Richmond County, is situated nearly in the geographical center of the state, on the Congaree River, which is formed here by the junction of the Broad and the Saluda. Charleston is 120 miles southeast, and Washington, D. C., is 488 miles northeast. Located on the Fall Line (which see), at an elevation of 200 feet above the river, Columbia has an attractive site whose charm is enhanced by wide, shaded streets and fine homes.

The city owes its existence to a decision of the general assembly of South Carolina, which in 1786 decided to move the state capital from Charleston to a more central location. At that time, the site chosen was covered by plantations. These were bought by the state, and a city was laid out. Population, 1928, 50,600 (Federal estimate).

Transportation. Railway service is provided by several branches of the Southern Railway, and by the Atlantic Coast Line, the Seaboard Air Line, and the Columbia, Newberry & Laurens Railway.

Industry. The development of the city's manufacturing interests has been furthered by the natural resources of the surrounding country, which has flourishing cotton plantations, forests of pine, abundant growths of hardwood in the river swamps, and valuable granite quarries. Columbia has become the fourth largest inland cotton-concentration point in the United States, and has cottonseed-oil mills, lumber mills, fertilizer plants, extensive car-machinery and iron works, and brick and tile plants. Large locomotive-repair shops of the Southern Railway are located just outside the city. In the vicinity of Columbia, there are extensive hydroelectric plants, capable of developing such power that the city is now the base of one of the largest superpower zones.

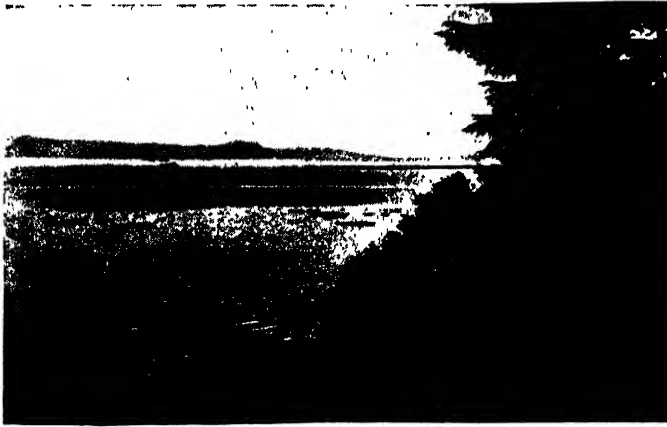
Education. In addition to its public-school system, Columbia has Chicora College and Columbia College for women, Lutheran Theological Seminary, two colleges for colored people, Benedict College, Allen University, an Ursuline Convent, and the University of South Carolina, which was founded in 1805.

COLUMBIAN ORDER. See *TAMMANY SOCIETY*.

COLUMBIA RIVER, a large and important waterway of the Northwestern United States and Southwestern Canada, one of the greatest salmon streams of the world, and equally famous because of the magnificent scenery along its course. It is nearly 1,400 miles in

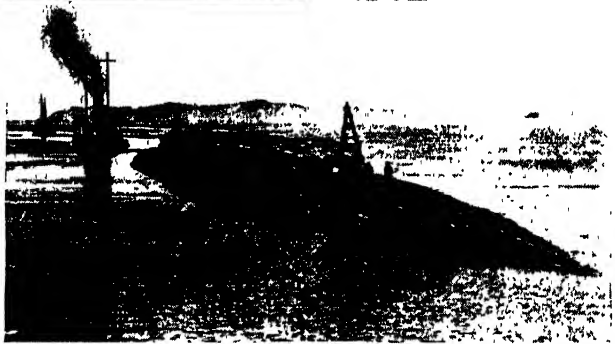
length, and drains an area of about 260,000 square miles, about equal to that of Texas. The Columbia River rises in the eastern chain of the Rocky Mountains of British

Rapids and falls break up the Columbia into several navigable stretches. One hundred sixty miles from its mouth, where the river crosses the Cascade Range, are the beautiful rapids known as the Cascades, extending for four and one-half miles through a narrow gorge. Around the rapids the United States government has built a canal, to enable ships to continue the trip of fifty-three miles beyond, to The Dalles, a series of falls and rapids eight miles in length. In May, 1915, there was opened for traffic a canal built around these rapids, connecting The Dalles and Celilo. From Celilo the river is navigable to Priest Rapids, a distance



Columbia and flows northwest for about 180 miles, through a famous hunting and trapping region, until the Great Bend is reached; then swinging about in a sharp curve, it flows southward into Washington.

Just before it crosses the United States boundary, it is joined by the Pend Oreille River, or Clarke's Fork. In Washington it follows a winding course, flowing south until it is joined by the Spokane River, then west, then south again, and then south-west until it reaches the Oregon boundary. Near the Oregon line, after meeting its largest tributary, the Snake River, it turns westward below the point of junction and



Photos Visual Education Service

SCENES ON THE COLUMBIA RIVER

The mouth of the river. A log raft being towed to lumber mills near Astoria.



Photo: Gifford & Prentiss

A SECTION OF THE HIGHWAY

Mitchell's Point Tunnel, also known as Bowlby's Tunnel.

forms the boundary between Oregon and Washington to the Pacific.

of 198 miles, and navigation is also possible on several shorter stretches farther upstream.

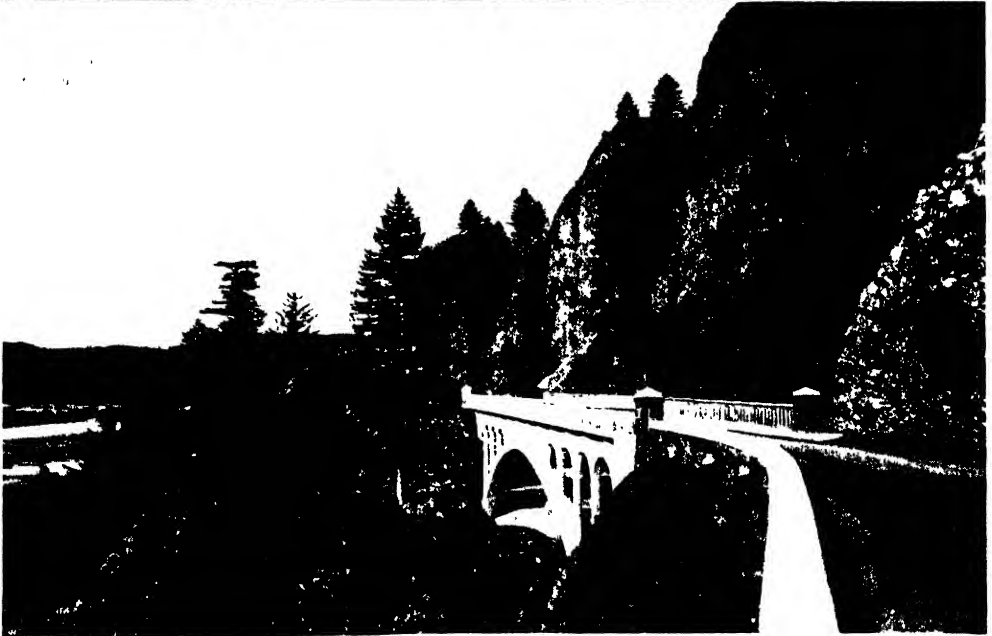
The river is important to commerce, as it has the only deep-water harbor between San Francisco and Cape Flattery, on the north-western coast of Washington, and the only fresh-water harbor on the Pacific. Vancouver, Washington, is thus favored, and vessels also ascend the Willamette, a branch of the Columbia, to Portland, Oregon. The old town of Astoria is at the mouth of the river.

Related Subjects. The reader is referred in these volumes to the following articles:

Astoria, Oregon
Columbia River Highway

Dalles, The
Snake River

COLUMBIA RIVER HIGHWAY. In 1856 the first rough dirt wagon road was cut through the wilderness in Oregon for six miles along the Columbia River. Nothing better illustrates the spirit of the West than the remarkable highway developed from that pioneer slashing through the woods. The Columbia River Highway is



Photos: Gifford & Prentiss

On the Columbia River Highway. The Oneonta Bluff and tunnel, Horseshoe Falls, and Shepherd's Dell are three beautiful views along the route.



Photo: U & U

WHERE THE COLUMBIA RIVER HIGHWAY EXTENDS INTO OREGON
Imposing cliffs of the Umatilla River Gorge, on the Oregon Trail.

one of the world's scenic roads, 60½ miles in length. It skirts the river over mountains, winds sinuously around hills, lies along valleys, runs through tunnels, and trails along embankments, and in every mile there has been an effort to preserve for the traveler the natural beauty of the region. On no part of the highway does the grade exceed five per cent—a notable engineering feat.

The Highway extends west from Portland through Astoria to Seaside on the Pacific Ocean, and east from Portland along three routes eight miles to the Sandy River. From this point a single road skirts the south shore of the Columbia River to the Hood River County line. Numerous bridges along the routes are of concrete, some of them over 300 feet long; one viaduct is 880 feet in length. Within ten miles on one part of the Highway are eleven waterfalls. At certain points the road is 700 feet above the river. The work of laying the road was begun in 1913, and the Highway was opened in 1915.

COLUMBIA UNIVERSITY, one of the oldest and most important universities in the United States, located in New York City on Morningside Heights, overlooking Riverside Drive and

the Hudson River. No other American university has so large an annual enrollment (including students in its Teachers' College, Barnard College, and College of Pharmacy), and, excepting Harvard, it possesses a larger endowment fund than any other school in America (about \$62,000,000). This great institution is the outgrowth of King's College, the charter of which was granted in 1754 by King George II. The first class was graduated in 1758; the work has continued without interruption since then, except for a few years during the Revolution.

When the institution was reopened in 1784, at the close of the Revolutionary War, it was called Columbia College, and in 1896 the trustees changed the name to Columbia University, Columbia College being reserved for the men's undergraduate department.

Women are admitted as professional students to the School of Architecture, the School of Journalism, the College of Physicians and Surgeons, the Teachers' College, and to the College of Pharmacy; as graduate students to the Schools of Philosophy, Pure Science, and Political Science, and to the Summer School

and extension department. See BUTLER, NICHOLAS MURRAY.

Barnard College, established in 1889 as Columbia University's undergraduate school for women. President Barnard of Columbia, for whom the college was named, tried in vain to have Columbia made a coeducational institution; the new college was established to supply the need of higher education for women. There were no funds and no promise of them, but the hopeful founders felt certain that these would come when the school had proved its worthiness, and their faith and patience were justified. To-day Barnard has buildings and grounds valued at \$3,000,000 and an endowment of \$1,300,000, for most of which it is indebted to women. It has approximately 900 students, to whom degrees are granted in the name of Columbia University. The president of Columbia is president *ex officio* of Barnard, but the latter has its own board of trustees and its own instructors.

Frederick Augustus Porter Barnard (1800-1889), founder of the above named college, was born in Massachusetts, and educated at Yale. He began his career as a teacher of the deaf and dumb, but in 1848 became professor of natural philosophy and mathematics in the University of Alabama. In 1856 he was elected president of the University of Mississippi and in 1864 became president of Columbia College (now Columbia University), a position he held for twenty-four years. At his death he left most of his property to Columbia.

His Books. He edited, in 1872, Johnson's Universal Cyclopedia, and was the author of *A Treatise on Arithmetic*, *Letters on Collegiate Government*, and *Recent Progress in Science*.

COLUMBINE, *kol' um bine*, the name of certain species of wild and cultivated flowers belonging to the buttercup family. None of the garden species, however, surpasses in charm the wild columbine of Canada and the United States, whose scarlet and yellow blossoms may be seen in early spring—

Skirting the rocks at the forest edge
With a running flame from ledge to ledge.

This "rock-loving" columbine is much visited by bees and humming birds, for the five cone-shaped petals, tapering into rounded

spurs, form delectable horns of plenty for the nectar-loving creatures. The flowers are red on the outside and yellow within, and are further variegated by the yellow clusters of stamens and pistils that dangle from the inverted cups. Unfortunately, the wild columbine is becoming rare, for it always tempts the wild-flower vandal.

A closely related species, with blue and white blossoms, is the state flower of Colorado (see COLORADO).

Because of its wide distribution over the United States, and the fact that it is in full bloom in July, the wild columbine has been suggested as a worthy candidate for the honor of being selected the national flower of the United States.

Some of the cultivated forms show the national colors—red, white, and blue—and could be used appropriately for decoration. No flower has ever been officially adopted as the national emblem, but the columbine and goldenrod are frequently mentioned for the honor.

B.M.D.

Scientific Names. Columbines belong to the family *Ranunculaceae*. The wild columbine described above is *Aquilegia canadensis*. The Colorado species is *A. caerulea*. Both are sometimes called *wild honeysuckle*, erroneously.

COLUMBINE, a character in old-time comedy and in pantomime, first introduced to audiences, in Italy, about the year 1560. Columbine was the daughter of Pantaloon; in English pantomime, she was the object of the adoration of Harlequin. For over a century, these three characters were prominent in comedy throughout Europe. See PANTOMIME.

COLUMBITE. See COLUMBIUM, below.

COLUMBIUM, one of the chemical elements [see CHEMISTRY (Elements)]. It is found in the minerals columbite and tantalite; the former is found in Connecticut, and the latter in Sweden. It is a steel-gray powder. Columbite and tantalite are naturally similar; each has a sub-metallic luster, and is heavy, and each grades into the other.



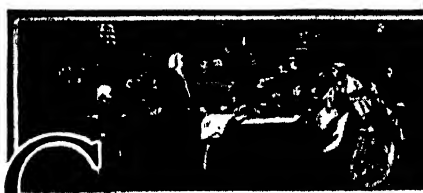
Photo at left, Visual Education Service

Bronzed and molded by wind
and sun,
Maddening, gladdening, every
one,

With a gypsy beauty full and
fine—

A health to the glorious col-
umbine.

—GOODALE: *Columbinae*.



COLUMBUS, CHRISTOPHER (probably 1451-1506), the discoverer of America. Slighted during his years of entreaties for assistance, and scorned as a half-insane fanatic; neglected and abused even after his wonderful discoveries, Columbus, in the centuries since his death, has been shown such honor as falls to the lot of few men. In the western hemisphere, which he first brought to the knowledge of men, countries, rivers, states, and cities have been named for him almost to the number of four score, and the favorite poetic name for the United States is "Columbia." All the honor shown him he richly deserved, for his were not chance voyages during which he happened upon new shores, but carefully planned expeditions, carried out by a clear-thinking man of large faith, in the face of opposition that would have daunted anyone less iron-willed.

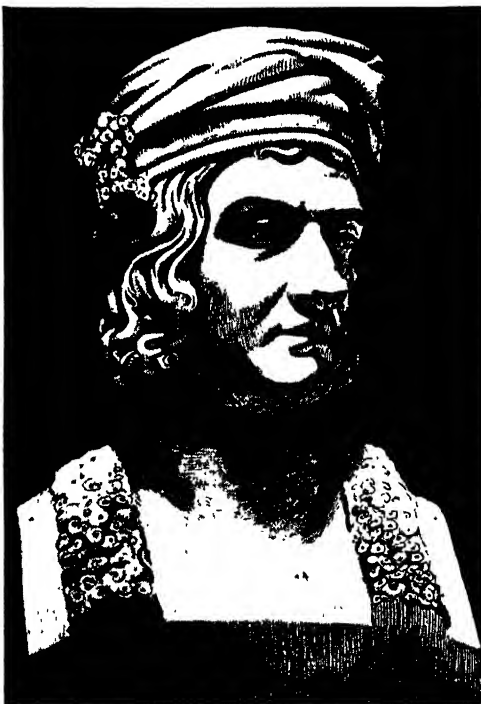
Early Life. The name as usually printed to-day is not quite as Columbus used it, for he was an Italian, and the correct spelling of his name was CRISTOFORO COLOMBO. He was born in Genoa, but as to the exact year of his birth there has been much uncertainty, some authorities holding that it was 1446, others that it was 1451, as given above. His father was a wool-comber, but Columbus had a love of the sea from his youth; trustworthy records declare that in 1470 he shipped as a sailor and for some years spent part of his time on the sea. Uncertain accounts of these early voyages have survived—accounts of a voyage to Chios, of an attempted one to England, which was prevented by the attacks of a privateer, and, most interesting of all, of one to Iceland. Did Columbus really reach that northern island, and perhaps hear from the Norsemen there of the land beyond the western seas which their ancestors had reached—a land later called America? Legend-loving people have delighted to think so, but there seems little, if any, foundation for the tradition.

By 1477 Columbus had settled in Lisbon, for Portugal was in those days the country most favorable to navigators; and there, in 1478 or 1479, he married a lady of good family, by whom he had one son, Diego. Certain members of his wife's family were navigators, and Columbus came into possession of their charts, which further increased his interest in geography. He himself

was an expert map-maker. In the works of Marco Polo he read much that inflamed his imagination—tales

of the wonders and riches of Far Cathay (China), of gorgeous cities, golden-roofed palaces; of Cipango (Japan), with its golden streets and its jewels; and he became more and more determined to find a direct route to those countries.

The Great Idea. It must be borne in mind that Columbus did not originate the theory that the earth is round. Aristotle, before the



CHRISTOPHER COLUMBUS

From the bust of the discoverer, now in the Capitoline Museum, Rome.

beginning of the Christian Era, had preached that doctrine, and many educated men through all the ages since his time had believed it. The mass of the people, to be sure, still held that the earth was flat, and even those who believed differently had some very curious notions. There could be no inhabitants on the other

side of the globe, they contended, because they would be walking head down and would naturally fall off; and it was not safe for a



MAP OF THE WORLD IN COLUMBUS' BOYHOOD
The white area represents extent of explorations.

ship to sail down one side of the earth, because it could not possibly get up on the other. But



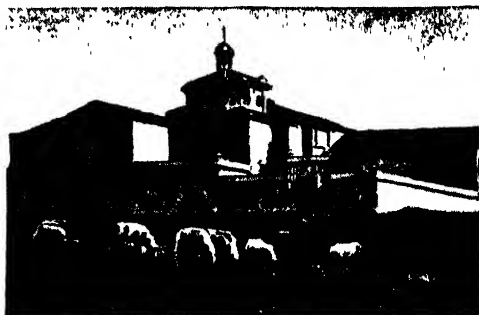
Photo. Wide World

THE HOME OF THE MAN WHO DISCOVERED AMERICA
In this modest dwelling in Genoa, Italy, the great navigator lived before he began his journeys in search of financial aid for his great enterprise.

none of these difficulties discouraged Columbus. If the earth were round, the countries to the east (China, Japan, and the Indies) could

certainly be reached by sailing westward, and he was willing to risk his life to prove it. Of the great continent of America, which lay in his way, he knew nothing.

He could not start out on such an expedition as planned without very substantial aid, and this it seemed impossible to procure. Men laughed at him—men who afterward would have given their fortunes to have posed as his patrons. At first he went to Genoa, his native town, and besought wealthy men there to finance his expedition; then he turned to King John of Portugal, who had been generous to other navigators. Failure met his every effort, however, and in 1484 he went to Spain, to lay his case before Ferdinand and Isabella. His life during the following years presents a pathetic picture. With his little son Diego he journeyed from one Spanish city to another, following the court, and pleading not for himself but for his great idea. At times, utterly weary, he rested in the monasteries, but he could not long remain inactive. Finally, late in 1491, he decided to leave Spain for France, and was on his way when he stopped at the convent of La Rabida. There he made the acquaintance of Juan Perez, who had formerly

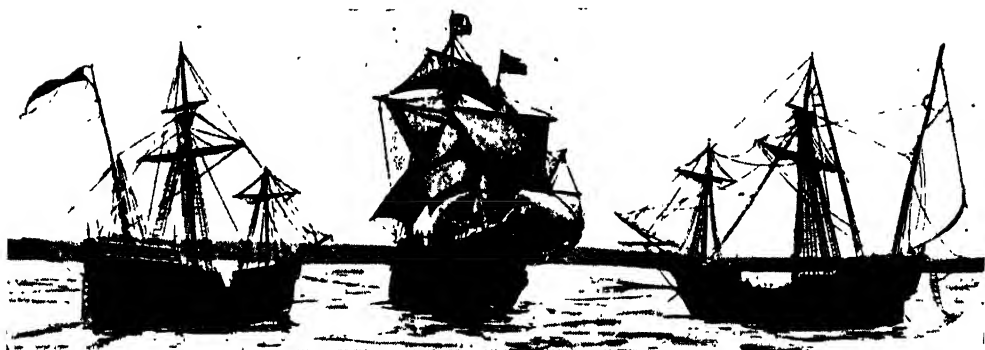


THE CONVENT OF LA RABIDA

The reproduction of this building at the World's Columbian Exposition, Chicago, 1893, made it a familiar object to millions of people. The building was burned in 1922.

been Queen Isabella's confessor, and Perez, inspired by the zeal of Columbus, wrote a letter to the queen which resulted in the recall of Columbus. Through the queen's aid—according to some accounts, through the sale of her jewels—three vessels were fitted out for him, and he was authorized to take possession in the name of Spain of all the land he might discover.

America Discovered. On August 3, 1492, Columbus set sail from Palos with his three little sailing vessels, the *Nina*, the *Pinta*, and the *Santa Maria*, the largest of which had a deck length of but 163 feet. It was, perhaps, the bravest exploit ever undertaken, for he was sailing not along the coast but straight out into the "Sea of Darkness," as the Atlantic was



THE PINTA, THE NINA, THE SANTA MARIA

These replicas, brought from Spain, were presented to the city of Chicago and given a permanent anchorage in the lagoons in Jackson Park, the site of the World's Columbian Exposition in 1893. In 1914 the *Pinta* was loaned to the San Francisco exposition; it was to journey through the Welland Canal, down the Saint Lawrence River to the ocean, then southward to the Panama Canal, and up the coast to California. At Erie, Pa., it was found unseaworthy, and there it was left.

then called, every minute farther and farther from the only land he really knew. History shows few figures more sublime. His crew did not share his belief as to the outcome of the voyage; they feared the hideous monsters with which they believed the ocean was filled, and as they sailed week after week with no sign of land, they despaired of ever finding their way back to Europe. According to some accounts, they threatened mutiny, but through it all Columbus remained firm and refused to turn back. Joaquin Miller, in his poem *Columbus*, has shown well the spirit of the man:

Behind him lay the gray Azores,
Behind the Gates of Hercules,
Before him not the ghost of shores,
Before him only shoreless seas.
The good mate said: "Now must we pray,
For lo! the very stars are gone.
Brave Admiral, speak, what shall I say?"
"Why, say, 'Sail on! sail on! and on!'"

Finally, signs of land began to appear, such as broken branches of trees, and land birds; and on October 12 came the triumph:

Then, pale and worn, he kept his deck,
And peered through darkness. Ah, that night
Of all dark nights! And then a speck—
A light! A light! A light! A light!
It grew, a starlit flag unfurled!
It grew to be Time's burst of dawn.
He gained a world, he gave that world
Its grandest lesson: "On! sail on!"

Early in the morning, they landed on an island which Columbus called San Salvador, now supposed to be the present Watling's Island, one of the Bahamas. This, he felt sure, was not Cipango; neither was Cuba, which he reached later, a part of that land; but he did believe Cuba to be a part of Asia. Haiti, on which he landed in December, he named Española ("Little Spain"), and this he decided must be the marvelous Cipango. Nor did he,

to the day of his death, ever know that he had reached, not Japan, but a land the knowledge of which had never before come to the ears of Europeans. On the island of Haiti he left a colony of thirty-seven men and there built a fort, and in January, 1493, began his return voyage, taking with him some gold and a few of the island Indians. Most enthusiastic was the reception given him by the king and queen

and by the people, for had he not opened up to them the wealthy Indies?

Later Voyages.

For his next voyage, Columbus had no difficulty in securing ships, money, and men, and when he set out on September 25, 1493, he had with him seventeen ships and 1,500 men. After touching at Dominica, he went on to Española, but his disappointment was great when he found his colony had disappeared. The natives, cruelly treated by the Spaniards,



ARMOR OF COLUMBUS

Preserved in the Royal Arsenal,
Madrid, Spain.

had put them all to death. Other men were willing to stay, however, and a new colony, called Isabella, was founded, and there and on neighboring seas Columbus spent two years. There was constant friction, however, as was

natural among so many ambitious men; and enemies at home were having too long a time to spread evil reports about him, so in 1496 he returned to Spain, where again the sovereigns showed him great favor.

During his third voyage, on which he set out in May, 1498, he took a more southerly course, and after sighting Trinidad, sailed for a few days along the coast of South America. Then he proceeded to Española, where he found a new town, Santo Domingo, in the ascendancy, and in general viewed a most troublesome state of affairs. In vain he tried to restore order; he was not as able an administrator as he was a navigator, and in August, 1500, he was superseded as governor of the island by Bobadilla, sent out from Spain through the effort of Columbus' enemies. The veteran admiral was harshly treated, placed in chains, and sent back to Spain, where this cruel handling of him roused great excitement among the people. The king and queen had him freed, denied any part in his arrest, and in 1502 allowed him to set out on another voyage—his fourth and last. Contrary to instruction, he anchored off Santo Domingo, but was not allowed to land, and went on to the west, sailing along the coast of Central America. Everything he attempted seemed to fail. The colony he founded in Central America was abandoned, his vessels, worn and rotted, gave out at Jamaica,

and there he with his followers remained while a messenger set out in a canoe for Santo Domingo to find help. Month after month Columbus waited, but finally the messenger returned with a vessel which he had secured, and the little band of castaways set sail for Spain.

Through much of this voyage Columbus had been ill, and affairs in Spain were not such as to encourage him. Isabella died soon after his arrival, and Ferdinand steadfastly refused to interest himself in any further explorations or in seeing that Columbus received his rightful recognition. Disappointed and worn out, Columbus died at Valladolid on May 20, 1506. He was buried in a monastery in Seville, but in 1542 his body and that of his son Diego were removed to Santo Domingo, in Haiti, and placed in the cathedral there. Two centuries and a half later, in 1796, both bodies were carried to Havana, but even there they were not allowed to rest. When Spain lost Cuba in 1898, these precious possessions, the body of the greatest navigator who ever sailed in the name of Spain, and that of his son, were borne again to Seville, and there placed in the cathedral.

[The above statement presents the account of the removal of the body of Columbus which seems justified by known facts. However, both Havana and Seville claim the honor of holding his remains. It is believed that the burial vault of Columbus in Santo Domingo contains the body of his son Diego.]

Summary. Farseeing as he was, Columbus could have no conception of what his discoveries really meant to the world. That the course of history would be entirely changed, that prosperous, progressive nations would grow up in the new hemisphere which he had discovered, he never imagined. Other navigators, convinced that the dangers of the open sea were less than they had believed, made the same voyage, and one, Americus Vesputius, had the honor of giving his name to the great



THE LANDING OF COLUMBUS

Facsimile of a wood-engraved title of an Italian pamphlet printed in Florence in 1493, representing the landing of the navigator in the New World. Needless to say, it is not historically accurate. The original engraving is in the British Museum.



THE COLUMBUS COAT OF ARMS



COLUMBUS DAY

OCTOBER 12

Suggested Programs

I

Roll Call—Cities, Rivers, and Countries named for Columbus

Song, *America*

ColumbusJoaquin Miller

Essay, *Early Life of Columbus*

ColumbusT. C. Adams

Dialogue, *From the Old World to the New*L. M. Hadley

Christopher C—

Columbus to FerdinandMason

Essay, *The First Voyage of Columbus*

ColumbusOlive E. Dana

Essay, *The Second Voyage*

Columbus Crossing the AtlanticArthur Hugh Clough

Essay, *The Third Voyage*

Columbus in ChainsMarie J. Jewsbury

Song, *Columbia, My Land*

II

Song, *Hail Columbia*Hopkinson

Essay, *What Columbus Knew About the World*

ColumbusL. H. Sigourney

Mrs. Christopher ColumbusM. S. Cowell

Dramatization, *Columbus Before Ferdinand and Isabella*

Columbus at the Court of SpainMrs. L. E. Boyd

Dialogue, *Queen Isabella's Resolve*Epes Sargent

Essay on *Courage*

ColumbusAubrey De Vere

Dramatization, *The Landing of Columbus*

Song, *Columbia, the Gem of the Ocean*



Outline and Questions on Columbus

I. Years of Preparation

- (1) Birth and early life
- (2) Love of sea
- (3) Marriage

II. The Great Idea

- (1) Belief of times as to shape of earth
- (2) Object of Columbus
- (3) Attempts to secure aid of
 - (a) Genoese merchants
 - (b) King of Portugal
 - (c) King and queen of Spain

III. His Voyages

- (1) First voyage
 - (a) The journey
 - (b) The discovery of the New World
- (2) Later voyages
 - (a) Colonies on Española
 - (b) Visit to South America
 - (c) Malicious efforts of his enemies

IV. Death and Burial

- (1) Grief over lack of recognition
- (2) Death
- (3) Burial at Seville
- (4) Subsequent removals of body

V. Estimates

- (1) What he thought he had achieved
- (2) What he really had achieved
- (3) Honors shown him since his death
- (4) Why these are deserved

Questions

How old was Columbus when he discovered America?

Why was one of the buildings at the World's Columbian Exposition known as *La Rabida*?

In what places has the body of Columbus lain? Why was it moved each time? Where is it now?

Why does Columbus deserve more honor than any mere adventurer who in the course of a voyage accidentally discovers new territory?

What were the ships of Columbus called? What kind of ships were they? Where may replicas of them be seen?

What was the idea of the people in the time of Columbus as to the shape of the earth? Was Columbus the first to hold a different view?

Why was the western hemisphere not named after Columbus?

With what event in the life of the explorer does the poem *Columbus in Chains* deal? What was the effect on the people?

For what countries was Columbus seeking when he first set out? Did he believe when his voyages were over that he had found them?

What indications are there in his early life that he was always fond of the sea?

What was the first land in the western hemisphere that he touched upon?

What traveler had written descriptions that influenced Columbus in his ambitious desires?

new continent. But Vespucci had been a friend of Columbus, and withheld nothing due his memory. Efforts were once made to change the name, to give honor where honor is due and call the western world Columbia, but the name had become too firmly fixed to be changed. On the four-hundredth anniversary of the first voyage of Columbus, in 1492 and 1493, there was held in Chicago a great exhibition to honor his name, and this was called the World's Columbian Exposition.

A.B.H.

Related Subjects. The following articles in these volumes will be found helpful by the reader interested in Columbus and his discoveries:

Caravel	Polo, Marco
Ferdinand	Vespucci, Americus
Haiti	World's Columbian
Isabella	Exposition

COLUMBUS, DIEGO. See CUBA (History).

COLUMBUS, GA., a leading cotton-manufacturing city of the South, and the county seat of Muscogee County, is situated on the western border of the state, at the head of navigation on the Chattahoochee River. Atlanta, the state capital, is 116 miles northeast. Population, 1928, 46,600 (Federal estimate).

Transportation and Industry. Railway accommodations are afforded by the Seaboard Air Line, the Central of Georgia, and the Southern Railway. The Chattahoochee River system is navigable from Columbus to the Gulf of Mexico.

Abundant power for manufacture is furnished by this river, which here has a fall of 120 feet in three miles, developing over 100,000 horse power. The cotton industry is paramount in Columbus, its twelve mills employing about 9,500 people. There are also cotton compresses and cottonseed-oil mills. Two plants manufacturing cotton gins are among the largest in the world.

Education. Columbus was the first city of the South to establish an industrial school to provide vocational training for pupils of both sexes. A primary industrial school for the children of the poorer wage-earners provides for "the little dinner-carriers" who carry dinners to relatives at work; study hours are regulated for their convenience.

History. Columbus was settled in 1827, and named for the discoverer of America; it was incorporated as a city in 1828. As early as 1845, it was a cotton center and possessed a cotton mill. During the war between the states, the Southern armies obtained important supplies and ammunition from Columbus. Here was fought the last battle of the war, the city being taken in April, 1865, by General Wilson. Ten miles from Columbus is Fort Benning, on a plot of 97,000 acres. With its 882 officers and nearly 4,700 enlisted men, this is the largest infantry school in America.

COLUMBUS, IND. See INDIANA (back of map).

COLUMBUS, MISS. See MISSISSIPPI (back of map).

COLUMBUS, OHIO, capital of the state, the site of the state university, and the county seat of Franklin County, is situated at the

junction of the Scioto and Olentangy rivers, on a level plateau 750 feet above sea level. The city is near the geographical center of the state. Cleveland is 170 miles northeast; Cincinnati, 120 miles southwest; Toledo, 132 miles northwest. These three cities are the only Ohio municipalities larger than Columbus, which increased in population from 237,000 in 1920 to 297,000 in 1928 (Federal estimate).

General Description. The city has an area of about forty and one-half square miles, and is laid out on the general plan of a Maltese cross, with the two main streets, Broad and High, intersecting at right angles. High Street, a main business thoroughfare, is a north-and-south street 100 feet wide and ten miles long. Broad, a residential street, is 120 feet wide and ten miles long, and for the distance of a mile from the downtown section is divided by a parkway into a central portion for heavy vehicles and narrower lanes on both sides for pleasure vehicles.

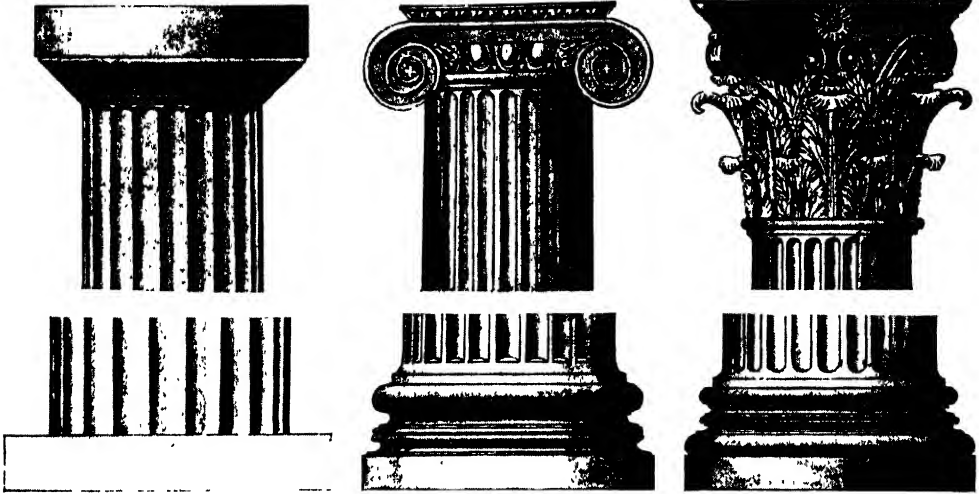
At the intersection of Broad and High streets and two blocks from the Scioto River is Capitol Square, a park of ten acres, in the center of which stands the state capitol. This fine edifice is constructed of native gray limestone, in the Doric style of architecture. A cylindrical rotunda 158 feet high rises from the center, upon the walls of which is the painting by William H. Powell of *Perry's Victory on Lake Erie*. The massive buildings of the judiciary department are connected with the capitol by a stone terrace. At the west entrance to the square is a McKinley memorial arch, sculptured by H. A. McNeil. On the capitol grounds is a group of statuary comprising monuments to Ulysses S. Grant, Rutherford B. Hayes, James A. Garfield, William T. Sherman, Philip H. Sheridan, Salmon P. Chase, and Edwin M. Stanton. Of this group, the people of Columbus say, "These are my jewels."

A newer project is the development of a Civic Center along the Scioto River. This project has been worked out by a city-planning commission, and embraces a new concrete bridge, a fine central high school, a new city hall to replace the old one burned in 1921, and various lodge and club edifices. Since the World War, Columbus has carried through an extensive program of public construction, including the enlargement of the water-supply reservoir by the building of a new dam which impounds 5,000,000,000 gallons of water.

Columbus has many attractive parks, with a combined area of about 340 acres, and beautiful residential sections. The Ohio state fair grounds are in the northern part of the city. Northeast of Capitol Square, occupying a park of eighty acres, is Fort Hayes, headquarters of the Fifth Army Corps. In 1923 Norton Aviation Field was established in East Columbus, near a United States general reservation for the

accommodation of war supplies. In May, 1929, the Columbus Municipal Airport was in readiness to accommodate air travel.

completed in 1831. The borough obtained a city charter in 1834, and in 1871 annexed the greater part of Franklinton, the older town



THE THREE STANDARD COLUMNS IN ARCHITECTURE

From left to right, the Doric, Ionic, Corinthian. For further illustration of parts, see ARCHITECTURE.

Institutions. The Ohio State University (see OHIO) is situated in the northwestern part of the city, on a beautiful campus of 440 acres, extending along the Olentangy River. Other important educational institutions include Capital University and Theological Seminary (Evangelical Lutheran), and the Columbus Art Institute. The Ohio State Library occupies a room in the capitol. It contains a large traveling library, from which responsible organizations or individuals in any part of the state may borrow books. Other public libraries are the city library, the law library of the supreme court of Ohio, and the university and public-school libraries.

Industries. Industrially, Columbus ranks fourth among the cities of the state. It is one of the greatest railroad centers in the United States, and is on or directly connected with all of the important roads of the East. Nine electric railways operate out of Columbus. Near by are large coal beds and oil and gas wells. There are over 575 manufacturing plants in and close to the city, employing 24,000 people and producing \$180,000,000 worth of products annually. The most important manufactures are foundry and machine-shop products, such as mining and conveying machinery, contractors' equipment, steel cars, steel castings, automobile accessories, aeronautical equipment, etc. Columbus ranks high among the cities of the United States in varied manufacturing.

Historical. The first settlement on the present site of the city was made on the west bank of the river in 1797, and named Franklinton. In 1812 the city was made the state capital, and a new location was planned across the river, on what was then heavily timbered land. In 1816, at the time of the first meeting of the legislature on the new site, the settlement was incorporated as the borough of Columbus. The Columbus branch of the Ohio Canal was

across the river, which had never been incorporated. A new city charter, effective in 1916, provided for a modified Federal plan of the home-rule type, with a mayor and a legislative council of seven members elected by the city as a whole. The charter provided for a non-partisan ballot, preferential voting, the recall of elected officials, and the referendum. A city-planning commission was created in 1920, and in 1923 the city adopted a zoning ordinance.

One great disaster in the history of Columbus was a flood on March 25, 1913, when nearly a hundred persons lost their lives; the property damage reached \$20,000,000. Extensive flood-protection works have been constructed to prevent a recurrence of the disaster, and a relief fund, created by the city council, is ready to cope with any type of disaster which may hereafter occur.

D.G.S.

COLUMBUS DAY. See page 1576.

COLUMN, kol' um, in architecture, a vertical structure, or pillar, designed chiefly to form a means of support for a weight above, usually serving both to strengthen and adorn. It may be constructed of any material—stone, wood, metal, marble, or brick. The typical column consists of three parts, the *base*, *shaft*, and *capital*. The shaft, which is the central, upright portion, is usually cylindrical in shape, though it may be modeled on any regular geometrical figure. The base is the lowest part, supporting the shaft, which is crowned by the capital.

In ancient architecture, the column appeared in a great variety of sizes and forms. The Egyptians, who used this architectural feature from a very early period, favored the heavy

and massive type of column, represented by the great central pillars of the Hall of Karnak, which were seventy-five feet high and fifteen feet in diameter (see full-page illustration, EGYPT). The Persian column, like the Greek, was generally tall and slender.

The Greek Orders of Architecture. Among the Greeks, the column was developed to a high degree of perfection, the styles of base, shaft, and capital conforming to special rules which made possible their classification into the three classic orders of architecture, the *Doric*, the *Ionic*, and the *Corinthian*. These are picturesquely described in Thompson's *Ode to Liberty*:

First, unadorned

And nobly plain, the manly Doric rose;
The Ionic then, with decent matron grace,
Her airy pillar heaved; luxuriant last,
The rich Corinthian spread her wanton wealth

Doric Column. This, the oldest and simplest of the three types, has a plain shaft which tapers slightly upward, the height of this being from five to seven times its lower diameter. Along the shaft are sixteen to twenty vertical, shallow grooves, or flutes, which meet in sharp edges. The capital has two parts of equal thickness. The upper, a square block, or plinth, called the *abacus*, rests upon the lower, a circular tablet called the *echinus*. Above the capital is a structure known as the *entablature*, consisting of three parts: the *architrave*, directly above the column; the *frieze*, or middle portion; and the *cornice*, or highest part. One of the most celebrated examples of Doric architecture was the stately Parthenon, on the Acropolis of Athens (see PARTHENON).

Ionic Column. The slender Ionic column, invented by the Asiatic Greeks, is a more graceful and decorative structure than the Doric. Its shaft, in height from seven and one-half to nine and one-half times its diameter, rises from a circular base to a capital adorned with scrolls, or volutes, connected by a horizontal band. Along the shaft are twenty-four flutes, separated by narrow, flat surfaces. Among the finest examples of Ionic architecture were the Temple of Diana at Ephesus and the Erechtheum at Athens (see ERECHTHEUM).

Corinthian Column. The most ornamental column is the Corinthian. It is a variation of Ionic, having a slender, fluted shaft, but a more elaborate capital. The latter consists of a bell-shaped core surrounded by one or two rows of acanthus leaves, above which are pairs of branching scrolls meeting at the corners in spiral volutes. Famous among the examples of Greek Corinthian art is the Monument of Lysikrates, at Athens.

The Roman Orders. Under the Romans, the column became an architectural feature of wonderful variety and beauty. Five orders are usually assigned to them, the Tuscan, Doric, Ionic, Corinthian, and Composite.

The *Tuscan* is an elementary Doric, with a column seven diameters in height. Their *Doric* column, borrowed from the Greek, is generally provided with a simple molded base, which rests on a square plinth. The Greek *Ionic* they adopted with very little change, but

the *Corinthian* was greatly enriched and elaborated, becoming a distinct Roman order. To these four they added the *Composite*, formed by combining into one capital portions of the Ionic and Corinthian capitals, and especially pleasing to the Romans because of its rich ornamentation.

Columns designed to serve as memorials to famous personages and events were greatly favored by the Romans, who erected for this purpose massive towerlike columns fitted with interior staircases. Representative of these were Trajan's Column (see subhead under TRAJAN), and the Column of Antonine.

Columns of Later Periods. In early Christian and medieval European architecture the column was used freely and in a variety of forms, with notable modifications of the shafts. The interior of the beautiful Cathedral of Notre Dame, in Paris, begun in 1163, affords a conspicuous example of the combination of arch and shaft. With the Renaissance, there came a revival of all the Roman types of column, together with the invention of new forms of the shaft. Of special note are the colonnades of Saint Peter's Church in Rome and of the Louvre, in Paris. In modern architecture, the Greek, Roman, and Renaissance types of columns are used in public buildings and in large business structures to give an effect of grandeur.

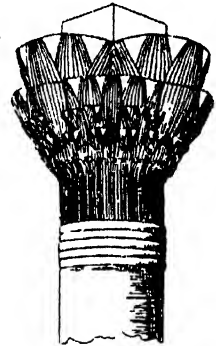
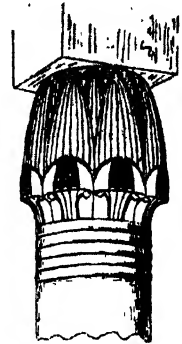
Notable examples are the Treasury Building, Washington, D. C., and the building of the Peoples Gas Light & Coke Company, Chicago, whose massive granite columns are the largest ever hewn in a solid piece. See ARCHITECTURE.

B.M.W.

COLUMN OF JULY. See JULY REVOLUTION.

COLUMN OF TRAJAN. See TRAJAN.

COMANCHE, *ko man' che*. See INDIANS. AMERICAN (Most Important Tribes).



EGYPTIAN COLUMNS

Above, closed lotus capital from the Ptolemaic epoch, taken from the Temple of Isis-us-ret in Philae. Below, open lotus capital in Edfu, dating from the time of the Ptolemies.

COMANCHIAN, *ko man' che an*, PERIOD. See CRETACEOUS PERIOD; GEOLOGY.

COMBAT, TRIAL BY. See ORDEAL AND COMBAT.

COMBINATIONS IN BUSINESS. See TRUST.

COMBINE, in agriculture. See REAPING MACHINE; WHEAT.

COMBUSTION, in the ordinary meaning of the term, is the union of oxygen with some substance which will produce light and heat. We ordinarily think of combustion only in connection with fire, but in its broadest meaning the term is much more widely extended. From the viewpoint of the chemist, any union of oxygen with another substance is combustion. The burning of chlorine in hydrogen is combustion, as is also the burning of any substance in chlorine.

The temperature of the burning substance depends upon the rapidity of the combustion. The amount of heat generated in the burning of a given substance, as a ton of coal, is always the same, if quality is unchanged, regardless of the time required in its combustion. If the coal burns slowly, the temperature is lower than when it burns rapidly, but the slow burning requires a proportionately longer time. See FLAME, for description of how combustion causes fire.

Spontaneous Combustion. Heaps of rags soaked with oil, or piles of bituminous coal which contain moisture and some other substances, occasionally take fire without being ignited from an outside source. Burning of this sort is termed *spontaneous combustion*. The fire is caused by the union of oxygen with the carbon and hydrogen in the combustible material with such rapidity as to raise the temperature above the igniting point. Very disastrous fires have been started in this way.

Superstitious people sometimes think that death is caused by spontaneous combustion. In *Bleak House*, Dickens attributes the death of the "Lord Chancellor of the Rag and Bottle Shop" to this cause, and vividly sets forth some of the circumstances. In the preface to this work, Dickens declares his description to be based on historic facts, but the theory is now rejected. T.B.J.

COMEDON, *kom' e don*, a blackhead. See ACNE.

COMEDY, *kom' e dih*, that branch of the drama which appeals to the sense of humor, keeps its readers or audience in a cheerful frame of mind, and has a happy ending. It is to be distinguished on the one hand from *tragedy*, with its serious manner and unhappy ending, and on the other from *farce* and *burlesque*, which depend on a broader, more exaggerated humor for their appeal. In its general sense, however, comedy includes farce and burlesque. See DRAMA.

The word *comedy* means a *revel* or a *festival*, and this particular type of the drama grew out of the old festivals in honor of Bacchus (which see). In these, a witty, sharp-tongued fellow, drawn about in a cart, would stop at intervals and make sport of the spectators, of the manners of the times, even of the men in power; and gradually this species of ridicule became more formal and shaped itself about a central plot. In modern times, comedy does not rank so high, perhaps, as tragedy, but some of the greatest writers have turned their genius to it, and have produced works that will live. There are Shakespeare's *Much Ado About Nothing*, *As You Like It*, *Twelfth Night*, and *Comedy of Errors*, for instance, and Molière's *Miser*, *Misanthrope*, and *Imaginary Invalid*. These two authors are the greatest masters of comedy, but Goldsmith produced one comedy of note, *The Stoops to Conquer*, and Sheridan two, *The Rivals* and *The School for Scandal*. All of these continue deservedly popular.

Among the comedies of more recent times have been Shaw's *Man and Superman*, *Arms and the Man*, *Candida*, *Androcles and the Lion*, and *Pygmalion*; Barrie's *What Every Woman Knows*, *Quality Street*, and *The Little Minister*; and Pinero's *The Mind-the-Paint Girl*. Representative of the comedies of still later date are *Lightnin'*, *Seventeen*, *The First Year*, and *They Knew What They Wanted*. America has produced few writers of comedies whose works have the qualities which make for permanence, but the names of Denman Thompson, James A. Herne, Bronson Howard, Clyde Fitch, David Balasco, Percy Mackaye, Augustus Thomas, George M. Cohan, Rachel Crothers, Owen Davis, and others are well known to the theater-going public.

COMEDY OF ERRORS. See SHAKESPEARE (Synopsis of the Plays).

COMENIUS, *ko ma' ne oos*, or *ko me' ni us*, JOHN AMOS (1592-1671), born in Austria, the man who published the first illustrated textbook, and the pioneer in modern educational methods. His parents died when he was a young child, and he was brought up by guardians and educated in the faith of the Moravian Church. He completed his education in the universities of Amsterdam and Heidelberg. Comenius began teaching at the age of twenty-two, and at once determined to reform the methods of instruction then employed. He characterized the schools as "slaughter-houses of the mind" and "places where minds are fed on words." Two years after he began teaching, Comenius was ordained a preacher in the Moravian Church, and although he rose to the rank of bishop, he is nevertheless remembered chiefly by his work in education.

Comenius was a voluminous writer, but of his many works only two exerted a lasting influence on education. These are the *Gate of*

Tongues Unlocked, and *The World Illustrated*; the latter was the first illustrated textbook, a page of which is reproduced on this page on a scale one-half its original size. The first book completely changed the method of teach-

Flying Vermin

XXV

Insecta volantia.



<p>The <i>Beë</i>,¹ maketh honey which the <i>Drone</i>,² devour- eth. The <i>Wasp</i>,³ and the <i>Hornet</i>,⁴. molest with a sting; and the <i>Gad-Beë</i> (or Breese),⁵. especially <i>Cattel</i>;</p>	<p><i>Apis</i>,¹ facit mel quod <i>Fucus</i>,² depascit <i>Vespa</i>,³. & <i>Crabro</i>,⁴. infestant oculo; & <i>Oestrum</i> (<i>Asilus</i>),⁵. <i>imprimis pecus</i>.</p>
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A PAGE FROM *The World Illustrated*
Reproduced one-half the size of the original.

ing languages, and within a few years it was translated into nearly all the languages of Europe and several of those of Asia. "For many generations, the schoolboys of three continents thumbed this book as their primer to the languages." The other work was written to emphasize Comenius' principle that in teaching the *idea* should precede the *word*. Upon these works the fame of this great educator rests.

COMET, *kom' et*, a heavenly body, popularly regarded as a star with a tail, occasionally seen in the sky, although some have no tails and always appear circular. The name is derived from the Greek word *kometes*, which literally means *long-haired*, in reference to the beard or tail which usually precedes or follows the comet. Few comets are visible to the naked eye. About 900 of these celestial bodies have been recorded; there are probably thousands that cannot be detected by the most powerful instruments, though some of them are of great size. It has been estimated that Halley's comet (see below) contains 25,000,000 tons of matter. Apparently, comets consist of three parts—the *nucleus*, or bright, starlike portion, which averages 4,000 miles in diameter; the *coma*, or mass of matter surrounding it, which is anywhere from 30,000 to 100,000 miles in diameter; and the *tail*, which may be 100 million miles in length. The three parts are not always clearly defined, however, and the comet may appear merely as a luminous haze.

When a comet has a tail, it is a mass of gaseous matter and solid particles scattered by the nucleus of the comet itself, and is formed when the nucleus comes under the influence of the sun. As it approaches the sun, the tail is behind the nucleus; as it travels away from the sun, the tail precedes it. In other words, the matter of which the tail is composed is repelled instead of being attracted by the sun. It was formerly believed that nearly all comets came from outside the solar system, but it is now considered very likely that nearly all of them revolve around the sun in very elongated elliptical orbits, their periods of return to perihelion being reckoned in thousands of years. Some, by reason of coming within the influence of the attraction of Jupiter, have had their periods shortened, and so have become recognized as periodic comets. They are visible only in the small part of their orbits near perihelion, that is, near the sun. The duration of visibility ranges from a few days to one or two years. See PERIHELION.

The last conspicuous comet seen without the aid of a telescope was Halley's comet, named after its discoverer. Halley announced in 1682 that this visitor would return in 1759, 1835 and 1910, and his predictions were fulfilled. It is predicted that the comet will be visible next about 1986.

In addition to Halley's comet, the most important include Biela's, which in 1846 broke into two parts, and has since entirely disap-

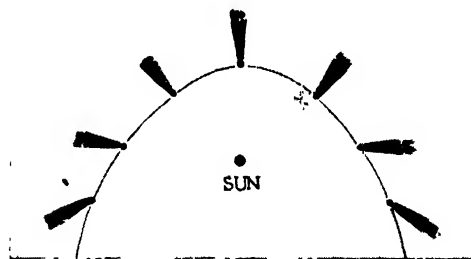


Diagram showing how a comet's tail always points from the sun.

peared; Encke's, which returns at regular intervals of a little over three years, and the Great Comet of 1882, which was so bright as to be visible in broad daylight. In 1858 one of the most typical of all comets was discovered by Donati. It was singularly bright, and was watched by astronomers with great interest as it passed through the various stages of cometary development.

It has always been customary among superstitious people to regard the appearance of a comet as a portent of disaster. The appearance of a comet in 1456 caused such terror that in every Christian church in Europe the prayer,

"Lord, save us from the Devil, the Turk, and the comet," was added to the service. Science has so thoroughly explained the phenomenon, however, that it is only the most ignorant who



Photo Visual Education Service

HALLEY'S COMET

regard such an appearance as otherwise than natural. What would happen if the earth collided with a comet's tail would probably be merely a dust storm. Even a collision with the head of a comet might not cause more than a profuse shower of meteors. F.B.L.

Related Subjects. The following articles in these volumes contain information which will be helpful to the reader interested in this topic

Astronomy	Meteor	Parabola
Halley, Edmund	Nebula	Star

COMITIA, *ko mish' i ah*, the legal meetings of the ancient Romans, in which the people, summoned by a magistrate, voted on questions relating to the state. They are thus to be distinguished from the *contiones*, or mass meetings. The oldest form of assembly was the *Comitia Curiata*, or assembly by *curiae* (wards), the members of which belonged to the patrician, or favored, class. This assembly made laws, determined upon peace and war, and elected the king.

In the reign of Servius Tullius a new assembly was created, the *Comitia Centuriata*, in which the vote was taken by units containing 100 or more persons, and which were called *centuries*. This assembly, which was made up of both patricians and plebeians, gradually took over the powers of the earlier body. The third assembly, the *Comitia Tributa*, the assembly by tribes, was the democratic body of Rome. It met in the Forum, and in the course of time gained a position of supreme importance. According to the best authority, the *Comitia Tributa* was composed entirely of plebeians.

Related Subjects. The reader is referred to the following articles in these volumes:

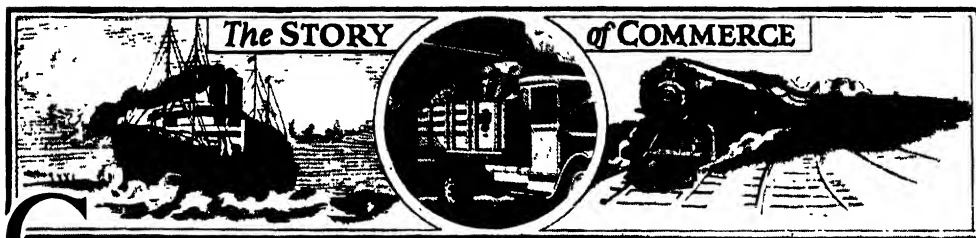
Forum Patrician Plebeians Rome (Ancient)

COMITIA CURIATA, *ko mish' i ah ku ri a'-tah*. See **ROME** (The Period of Legend)

COMMA. See **PUNCTUATION**

COMMANDMENTS. See **EXODUS**.

COMMANDER. See **RANK IN ARMY AND NAVY**.



COMMERCE, *kom' urs*. In its widest sense, the term *commerce* refers to any exchange of commodities or business intercourse between persons or organizations, but it is commonly restricted to intercourse between nations. Local exchange of commodities is usually known as *trade*.

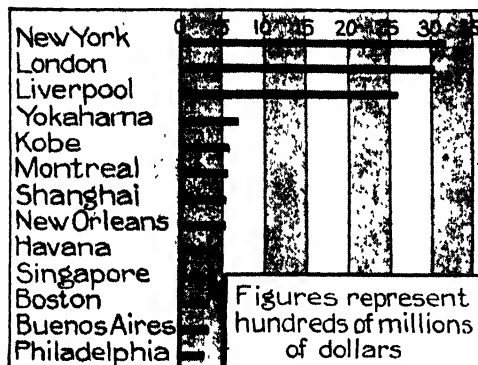
Commerce was one of the first developments of civilization; barbaric communities or nations are almost necessarily self-supporting; they must find at home everything necessary to support life. It has been, from the earliest times, one of the factors which have preserved friendly international relations; for a nation's surplus products, which represent its accumulation of wealth, can be sold only to other nations with which it is at peace.

The first method of trade and commerce was *barter*, or the exchange of one commodity for

another. This was soon made simpler by the use of money; with the further development of industry and civilization, exchanges became so common that some men devoted themselves entirely to conducting them. This class became known as merchants, persons who dealt in *merx* (the Latin word for wares and merchandise). The first merchants who traveled from one region to another to dispose of their wares were the Arabs, who journeyed overland by caravan, but the greatest merchants of antiquity were the Phoenicians and the Carthaginians.

Commerce between Europe and the Far East was greatly stimulated by the Crusades, but international trade did not become general until the sixteenth century. The discovery of America was due primarily to the desire to find a short route to India, and in turn it stimu-

lated further discovery and exploration of new fields of commerce. Each European country began to guard with greater care the colonies it had established, and tried to restrict their trade with nations other than the mother country. It will be remembered that



PRINCIPAL PORTS OF THE WORLD

The thirteen cities which possess the greatest foreign commerce in average normal years.

England endeavored to force the American colonies to trade only with Britain. The wars of the eighteenth century and the Napoleonic era destroyed nearly all commerce, but the discoveries and inventions of the nineteenth century began a new age. The steamboat, the railroad, the telegraph, the telephone, even the radio, have all played their part in trade development.

Once commerce was restricted to commodities of great value in small bulk, such as precious stones. To-day, cheaper methods of transportation make it possible to ship not only precious articles, but bulky raw materials, for long distances. Not only that, but it is now possible to transport perishable commodities by refrigeration, or cold storage, to the very ends of the earth. The people of London, for example, eat butter and eggs from Denmark, beef and mutton from the Western United States or from Argentina, apples from Ontario, oranges from California. The bread they eat is made from wheat raised in Saskatchewan, North Dakota, or Minnesota, their tea comes from Ceylon or Japan, and their coffee is raised in Brazil or Arabia. In short, there is hardly anything produced by nature or by man which is not an item of commerce. For details of the commerce of the world, see articles on the separate countries. F.H.E.

Related Subjects. The following list of articles in these volumes which relate to commercial topics does not confine itself to the narrower sense of the word *commerce*, but includes articles bearing upon trade and various phases of business

Accountancy
Advertising
Auction

Balance of Trade
Banks and Banking
Bears and Bulls

Bill of Exchange
Bill of Health
Bill of Lading
Bill of Sale
Board of Trade
Bonded Warehouse
Bookkeeping
Boycott
Bucketshop
Caravan
Chamber of Commerce
Check
Cold Storage
Commercial Agency
Commerce, Department of
Common Carrier
Commercial Law
Corporation
Department Store
Draft
Exchange
Express Company
Federal Trade
Commission
Free Trade
Fur and Fur Trade
Good Will
Grace, Days of
Hudson's Bay Company
Insurance
Interstate Commerce
Act
Joint-Stock Company
Lloyds'
Meat and Meat Packing
Merchant Marine
Money
Monopoly
Negotiable Paper
Note
Partnership
Profit
Profit Sharing
Receipt
Receiver
Standard Oil Company
Stock, Capital
Stock Exchange
Tariff
Trade-Mark
Transportation (with list)
United States Steel Corporation

COMMERCE, CHAMBER OF. See CHAMBER OF COMMERCE.

COMMERCE, CHAMBER OF, OF THE UNITED STATES. See CHAMBER OF COMMERCE (U. S.).

COMMERCE, DEPARTMENT OF, the ninth executive department of the United States government, originally established in February, 1903, as the Department of Commerce and Labor. In 1913 the Department of Labor (which see) was organized as a separate department. The Department of Commerce "fosters, promotes, and develops the foreign and domestic commerce, the mining, manufacturing, shipping, and fishing industries, and the transportation facilities of the United States." This Department has oversight of those activities which promote American industry.

The Department organization includes many important bureaus, such as the Bureau of Foreign and Domestic Commerce, Bureau of Lighthouses, Bureau of the Census, Coast and Geodetic Survey, Steamboat Inspection Service, Bureau of Fisheries, Bureau of Navigation, and Bureau of Standards. In 1925 the Patent Office was transferred from the Department of the Interior to that of Commerce. When the Department of Commerce and Labor was established two new Bureaus of first importance were created, the Bureau of Manufactures and the Bureau of Corporations; it was largely because of the necessity of these two that the Department was originally organized. The former remains a part of the present Department of Commerce, but the work of the Bureau of Corporations is now in the hands of the Federal Trade Commission (which see).

At the head of the Department is the Secretary of Commerce; he is a member of the Cabinet of the President, and receives a salary of \$15,000 per year. See CABINET; STANDARDIZATION IN INDUSTRY.

COMMERCIAL AGENCY. Wholesale dealers and manufacturers have many customers scattered throughout rural districts and smaller towns. Most of these customers are obliged to purchase goods on credit. Before the dealer can sell on deferred payments, he must know the financial standing of customers, their reputation for honesty, and other facts pertaining to them, to serve as a basis for credit. Since it is impracticable for dealers to gain this information themselves, they are willing to pay reliable firms to do it for them. Such firms are *commercial agencies*. The best of these agencies are reliable, and are considered authorities in their field. They issue an annual guide to their subscribers, which gives the financial standing and credit of practically every firm of any importance in America, and sometimes in the leading European countries. These ratings are denoted by letters and figures which are disclosed by a key; those not acquainted with the system employed cannot interpret the symbols. The two leading commercial agencies of America are Dun & Company and Bradstreet. F.H.E.

COMMERCIAL AGENT. See CONSUL.

COMMERCIAL EDUCATION. See EDUCATION, COMMERCIAL.

COMMERCIAL LAW, the branch of law that relates most directly to everyday mercantile transactions which are based on or modified by the usage of trade. The body of rules constituting this law is to a great extent uniform throughout the commercial world, the treaties and decisions of one country being applicable to the questions arising in any other, with due allowance for local differences of commercial usage. These rules embrace the laws of shipping, bills of exchange, insurance, bankruptcy, brokerage, partnership, negotiable paper, promissory notes, contracts, etc. In the United States, the term includes the law dealing chiefly with contracts. Much of the law on these subjects is of ancient origin, being derived from the Roman civil law.

Related Subjects. The reader is referred in these volumes to the titles embraced in the division of commercial law named within this article.

COMMERCIAL PAPER, a term synonymous with negotiable paper, which see.

COMMISSARS, *kom' i sarz*. See RUSSIA (Government).

COMMISSION. See BROKER.

COMMISSIONER OF EDUCATION. See EDUCATION (United States Bureau of).

COMMISSIONER OF INTERNAL REVENUE. See TREASURY DEPARTMENT.

COMMISSION FORM OF GOVERNMENT, a popular plan of city government which developed from conditions following the flood that devastated Galveston in 1900. That disaster disorganized the forces of law and order and left the city temporarily at the

mercy of groups of plunderers. Three men emerged from the crisis, took power into their own hands, and were valiantly supported by all good citizens. These self-appointed men exercised for a brief time all the powers ordinarily held by the city council, mayor, chief of police, and police judge. So successful was this expedient that Galveston adopted the plan permanently, and called it the *commission form of government*.

Within a few years, other cities one by one hesitatingly tried the same experiment; it met every condition of local government, and the plan soon began to spread rapidly. Commission government has since replaced the old forms in hundreds of cities and towns. This governmental form merges the legislative duties, formerly exercised by a city council, and the executive powers, usually held by a mayor, in a small commission, usually composed of five members. This commission is elected by the citizens at large, without regard to ward boundaries, class distinction, or party politics.

Advantages of the System. The first great advantage of the commission plan of government is that it concentrates power and responsibility in few hands. In other words, it makes the government of the city more like that of a business corporation, in which large powers are placed in the hands of a small board of directors.

A second advantage of the commission form is that it lessens the influence of political parties in local affairs. In the election of commissioners, nominations by political conventions and the use of party names and symbols are commonly done away with. The voters, having to choose but three or five men instead of a host of officials, can exercise wisdom in their balloting. The names of candidates are printed in alphabetical order, without party name.

Working Plan of the Commission. The law of Iowa, which may be taken as typical, divides the different departments as follows:

Department of Public Affairs, with the mayor at the head.

Department of Accounts and Finance.

Department of Streets and Public Works.

Department of Parks and Public Property.

Department of Public Safety

The five members of the commission, sitting together, decide policies, pass ordinances, levy taxes, and make the city budget. The commissioners may give their entire time to managing the affairs of the municipality, in which case they receive salaries for their services.

The Des Moines Plan. The form of government now known as the Des Moines Plan differs considerably from that which originated in Texas. Fundamentally, it is the usual commission plan, with certain important additions, including the referendum, the initiative, the recall, and non-partisan primaries.

The citizens have the right by vote to recall the commission, or any member of it, at any time, if displeased with his official conduct. They also have the right to veto the commission's acts through the referendum, and to originate legislation by means of the initiative. Candidates for commissioners seek election as citizens, on policies, or platforms, of their own suggestion, not as partisans on a party platform. Instead of being accountable to a political party, they may be called to account only by the people who elect them.

The commission form of government has now been adopted by over 400 cities.

Related Subjects. The reader is referred to the following articles in these volumes:

City	Initiative and
City Manager	Referendum
City Planning	Recall

COMMITTEE OF PUBLIC SAFETY. See ROBESPIERRE.

COMMITTEE OF THE WHOLE, any organized body deliberating as a group. It is usual for legislative or other bodies to appoint certain committees, to which specific matters are referred. A committee investigates the subject and determines whether it is of sufficient importance to come before the larger body, and if so, in what form it should be presented. Occasionally, however, the whole body, sitting as a committee and with no more power than any other committee, debates the matter. Its action is deliberative, rather than legislative; that is, it discusses the question in all its details. When its work is concluded, it adjourns, or "rises from the committee"; the body then assumes its ordinary functions and formally receives the report of what it accomplished in committee of the whole.

The Canadian House of Commons, when sitting as a committee of the whole, is presided over by the Deputy-Speaker, the official assistant of the Speaker. In the British House of Commons, a regularly chosen chairman, other than the Speaker, presides over the committee of the whole. When either branch of the Congress of the United States so sits, any member may be chosen to preside.

COMMITTEES OF CORRESPONDENCE, committees of patriots appointed during the American Revolutionary period, first by the towns of New England, then by the legislatures of the colonies, to prepare and circulate statements of American grievances and to secure protection against the claims of England. In November, 1772, Samuel Adams moved before the town meeting in Boston that a Committee of Correspondence be appointed, to act in keeping in touch with other New England districts and to state the rights of the colony, the proceedings to be kept secret. The plan was a great success, a large number of towns responding at once. Committees of a sim-

ilar nature were afterward appointed in nearly all the colonies. See REVOLUTIONARY WAR.

COMMODORE, *kom' o dohr*, formerly the title of an officer in the United States navy ranking above captain and below rear admiral. The rank was abolished by act of Congress in 1899, and all the commodores then in the navy were promoted to the rank of rear admiral. Formerly, when the fleet was divided into divisions, the commodore commanded a division. It was a very popular rank and carried with it much of the romance of the United States navy in early days. See NAVY; RANK IN ARMY AND NAVY.

COMMON CARRIER, a person or corporation whose business it is to transport passengers and goods either by water or by land, for a price. The term, therefore, includes teamsters, expressmen, and omnibus lines, street railways, railroads, steamboat companies, and pipe lines; in recent years, telephone and telegraph companies have been included by law, although they do not, strictly speaking, transport goods. Storekeepers and shop-owners who maintain a delivery service solely for the benefit of their customers are not common carriers.

The common carrier stands in intimate relation to the public, whose lives and property are in its care. Because of this confidential relation, the common law placed the carrier under two great obligations; first, its service is compulsory, for it must serve everybody who is able to pay; second, it is liable for loss or injury to goods or passengers carried. These general obligations have been regulated by statute. Interprovincial and interstate commerce are under the control of the national government, but the states and provinces also have individual jurisdiction. For this reason, it is impossible to do more than summarize the responsibilities of common carriers.

Carriers of Goods. It is generally stated that common carriers are responsible for any loss or accident except those due to an "act of God or of the public enemy." In this sense, an "act of God" means any unavoidable accident which occurs through no fault of a human being. The term "public enemy" includes pirates and any government which is at war with the government of the common carrier. Robbers, bandits, and rebels are not regarded as public enemies. A carrier, moreover, is not liable for damages which arise from natural causes, such as fermentation, evaporation, or decay, unless by his neglect perishable articles, as fruit and vegetables, have been delayed in transit. If the shipper or government authorities are in any way responsible for loss or accident, the carrier is not liable. The liability of a carrier may also be limited by a special contract or agreement. Express and freight receipts, baggage checks, and railroad

tickets are not only receipts, but are contracts in which the carrier limits his liability.

Carriers of Passengers. Passenger carriers are subject to a few special rules of law. While they are ordinarily required to accept as passengers any persons who offer to pay the required fare, they need not carry drunken or disorderly persons, or anybody with a contagious disease, or fugitives from justice, or those who board a train for the purpose of committing crime. A person who has paid his fare and conducts himself properly has a right to ride to his destination; if he is forced to leave the train, the carrier is liable for damages. In every case, the burden lies on the carrier to prove that it acted reasonably and within its rights, and that its negligence did not cause injury to the passenger. The carrier is not held responsible for passengers in the same degree as for goods, the assumption being that passengers are able to take some heed for themselves. So far as human foresight can insure safety, however, a carrier is responsible for the lives of its passengers. See INTERSTATE COMMERCE ACT.

COMMON COUNCIL, the name applied to the law-making body of a city or incorporated town, which may consist of two chambers, but is usually a single body. According to the typical organization of a city, the municipality is divided into districts called *wards*, each of which elects one or two *aldermen*, usually for terms of two years, to form the city council. As a general rule, one-half the members of this body retire every year. The chief executive officer is the *mayor*. A village differs from a city in organization in that the government is more simple. The village is not divided into wards, and the governing body is known usually as the *board of trustees*, six in number, elected by all the voters, one-half retiring each year. The chief executive officer is the *president* of the village.

Related Subjects. The reader is referred to the following articles in THE WORLD BOOK

Alderman Mayor Trustee Ward

COMMON LAW, the law distinguished from written or statutory law and derived from parts of the English law which do not rest for their authority on any express legislative act. Common law is therefore usually defined as the *unwritten law*. In this sense, common law consists in rules and principles compiled from reports of adjudged or judicially decided cases, and from popular custom and usage, in contrast to statute law, equity, and the civil law inherited by modern Europe and most of the states of America from the Roman Empire.

Common law is based primarily on customs growing out of the wisdom and experiences of mankind. In time, these customs, recognized as consistent, reasonable, and established,

are sanctioned by the courts, and are interpreted and made binding by the decisions of final courts of appeal. The United States in the true sense has no common law. Federal courts, when acting as common-law courts, follow the law as it stands in the state where the action arises, accepting common-law principles wherever involved. The courts of each state relied on the English common law until a fairly uniform system had been developed.

Related Subjects. The reader is referred to the following articles in these volumes:

Civil Law Equity Law Statute
Also, for another body of laws, see CODE NAPOLEON.

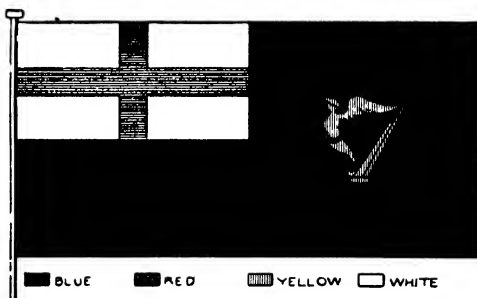
COMMON PLEAS, COURT OF, a unit in the judicial system of a few states of the American Union, adapted from the English judicial system, in which it is an important link. In most states it takes the name of county court or circuit court.

COMMONS, HOUSE OF, the name applied to the lower house of the Parliaments of Great Britain and Canada, as well as in some smaller nations. See PARLIAMENT.

COMMONWEALTH FUND. See EDUCATIONAL FOUNDATIONS.

COMMONWEALTH OF AUSTRALIA. See AUSTRALIA.

COMMONWEALTH OF ENGLAND, the official name of the government of England during the period when sole power was in the hands of the Parliamentary army and its leader, Oliver Cromwell; that is, from the exe-



BANNER OF THE COMMONWEALTH

cution of Charles I, in 1649, to the restoration of Charles II, in 1660. Though the name *Commonwealth* is usually associated with the entire period when England was ruled without a king, the government after 1653, when Cromwell became Lord Protector, is also known as the Protectorate.

Related Subjects. The entire story of the Commonwealth of England is summed up in the following articles in these volumes

Charles I Cromwell Long Parliament
Charles II England (History) Restoration

COMMONWEALTH OF NATIONS, BRITISH. See BRITISH EMPIRE, AND BRITISH COMMONWEALTH OF NATIONS.

COMMUNE, *kom mune'*, corresponding to the *township* of the United States and the English *parish*, is the smallest district of local government in France. A commune has the power to buy and sell property, contract debts, and appear in court. It is governed by a *maire*, or mayor, who is assisted by several deputies and the *conseil municipal*, a deliberative assembly. A commune may be a village of but a handful of people, or a great city like Paris. Ordinarily, there are twelve communes to a *canton*, the seat of a justice of the peace. See CANTON; TOWNSHIP.

COMMUNE OF PARIS, in French history, a name applied to two different governing bodies that ruled over the city of Paris. The Commune of 1792 was established during the French Revolution, at a time when disorderly conditions in the capital and the timidity of the city authorities made extraordinary measures necessary. The regular officials were turned out of office by the leading citizens of the different wards, who organized themselves into a city council and governed Paris themselves. The power of the Commune increased until it overshadowed that of the National Assembly, and its history became the story of the Revolution itself. See FRENCH REVOLUTION.

The name is also applied to an organized mob which was in control of Paris from March 18 to May 27, 1871, at the close of the Franco-German War (which see). Almost as soon as the German army left Paris, there were signs of revolt, and on March 18 the insurrectionists defied the authority of the regular French troops, took possession of the city and declared the National Assembly, in session at Versailles, to be without constitutional rights. The French government placed Marshal MacMahon at the head of the army, and on April 6 a siege of the city was begun. All opposition was crushed out by May 27, when the reign of the Commune came to an end. During the siege, the Communists destroyed many public buildings, including the Palace of the Tuileries, the famous former royal palace of France.

COMMUNISM, *kom' u niz'm*, is based on the theory that the individual should not hold property as his own, that the means of production are rightly held as a common trust, and that the profits arising from all labor should be devoted to the common good. As a theory, it has not only inspired some notable characters in history, but also much of the gradual evolution of economic organization, especially in the case of coöperation (which see).

In practical political affairs, many of the principles of original communist thought, being theoretical, have necessarily undergone modification. While the movement has gained strength in various countries, particularly where economic distress is acute, Russia and

its associated countries in Asia are the only notable examples of communist practice.

Communism as practiced in Russia, where it is also known as Bolshevism, regards the capitalistic state as a special organ of class power, a "force of repression," suppressing and exploiting the proletariat, the class without property; consequently, capitalism cannot represent the whole of society. Communism therefore regards revolution as the necessary first step in the emancipation of the proletariat.

In theory, when the state, thus seized, takes over the means of production in the interests of society, it becomes an organ of rule over things rather than people, controlling productive processes rather than the producers; moreover, in suppressing class distinctions, it destroys its own class basis and gives way to the machinery of a communist society. Then is freedom realizable.

In effect, however, while the communists of Russia hold that the working classes may be able to seize the power of the state, they do not consider them sufficiently enlightened to maintain it; hence the workers require a committee to act for them—the communist party. This party maintains the right to exercise the dictatorship, not only during the period of civil war, but afterward, contending that in taking over the government, the army, and the administration, it is necessary to maintain possession of the state as the "special force of repression" over the former ruling class. Russian communism, because its adherents must submit to the control of a few leaders, is thus actually non-democratic, in the usual sense of the word, and can be rendered democratic only in so far as the people secure and actually exercise participation in the Soviet system, through their elected representatives.

This sort of communism is a special movement somewhat closely allied with Marxian socialism, and has little in common with that "ideal" communism of utopian or religious bodies. Communistic schemes of the latter beneficent nature have found advocates in almost every age and in different countries, but no communistic society has as yet been entirely successful, though many have been organized and some still exist. The most famous of these in the United States were New Harmony, Ind., established by an Englishman, Robert Owen, and Brook Farm, in West Roxbury, Mass. Of those still in existence, the Oneida Community in New York, which was converted in 1881 into a joint-stock industrial company, and the Amana Society near Davenport, Ia., are of most importance.

L.L.B.

Related Subjects. The reader is referred in these volumes to the following articles

Amana
Bolsheviki
Brook Farm
Lenin, Nikolai

Oneida Community
Russia
Socialism
Soviet



COMMUNITY INTERESTS. The best thought of the world to-day is directed toward an ideal of universal peace; the realization of that ideal will mean that the nations of the earth have acknowledged and demonstrated that they are all members of one great family. On a small scale, this "get together" sentiment is bringing into close fellowship the families that make up the community. It is serving to exalt the spirit of neighborliness, in itself a symbol of world unity. As someone has written:

The starting point of every good—
Of larger life—is Neighborhood.
Its fear-free banners now unfurled
Mean hope of peace to all the world.
If we can meet and join as one,
Here, from all lands beneath the sun,—
Then neighbor-nations, too, shall—in our time—
Forge world-wide union in a bond sublime.

In many communities, one will find what may be called the "submerged element"—those who from a sense of their deficiencies are kept from getting what they should out of life. The handicap of poverty, of social inferiority, of physical weakness, or of whatever else it may be, has too often acted as a check to natural ability and promise. Whenever there is in any neighborhood a place where all may meet on a common level, as brothers and sisters of one community family, where the young people from the humblest homes join in the social and educational affairs of the center on the same footing as their more fortunate neighbors, then that neighborhood is working out, in a wholesome way, the problem of the submerged element. But even in a neighborhood where there is not this special problem, the "get together" spirit is one of the most encouraging phases of modern life. As this community-interest movement has come to stay, it will be well to examine the particular agencies by which it is perpetuated. One of these agencies is the Neighborhood Hall, a place where the individual may meet his friends, bring his family, and enjoy himself as freely as in his home. Recreation parks, containing gymnasiums, concert halls, playgrounds, and the like, are getting to be common features of towns and cities, and are serving to bring the people of the neighborhood into closer rela-

tionship. Probably the most influential phase of the movement, however, is the development of the public school as a community center. The good effects of this are no longer to be questioned; they have been proved.

The School as a Community

The utilization of school buildings as centers of community interests originated in the movement for a "wider use of the school plant." It was argued, and with reason, that it was a wasteful procedure to invest great sums of public money in buildings and equipment which were in actual service but a fraction of the time. Why should these costly buildings be closed every night in the week after four or five o'clock, during the school sessions, and be entirely idle in the vacation seasons? Why not throw them open when not occupied by the pupils, and let the people of the community utilize them for social, educational, and other purposes? These were the chief arguments advanced, and in course of time they produced results. It was not long before the idea of a wider use of the school plant was generally accepted without argument, and the first step was thus taken toward making the school a center of community interests. For the success of this movement, special credit is due Prof. Edward J. Ward, specialist in Community Organization, of the United States Bureau of Education.

One essential, however, was lacking. In a sense, the schoolhouse became a community center, but not one in which were held the meetings of a united body of people, working with harmony of aim and unity of interests. For example, the building would be set aside at stated times for purposes of registration and voting. At such times, the school principal would be without authority over the proceedings, and the premises would be occupied by half a dozen men quite out of harmony with the spirit of the school. Again, on one evening there would be a political meeting of the followers of a certain candidate, and on the next, a partisan rally for his rival. It was customary, also, to extend the use of the gymnasium and other parts of the building to athletic organizations of neighborhood churches and other bodies, each of which was quite independent

of the rest. A school principal, writing of these conditions, summarized them in these words:

There is no more unity of organization among the people who use the various free times and spaces of this school plant than there is among the people who happen to occupy the separated rooms of a hotel.

The story of the development of the school as a real neighborhood center is therefore the story of its expansion from a meeting-place for unrelated groups to a real community home. To those pioneers who studied the problem in all its phases, it seemed logical that the use of the school plant for other than the regular sessions should be determined and controlled by the school authorities, and, with that idea as a basis, something of the nature of the following has been worked out as an ideal program for the development of the community home.

The Community Forum. In any upbuilding of a harmonious community home, there must of necessity be a preliminary organization of the adult citizens of the neighborhood; to this end it has been found practicable to establish as a foundation stone the *community forum*, devoted to the presentation and open discussion of public questions concerning their common welfare. First, application for the use of the building should be made to the school authorities by means of a written petition, signed by a representative number of adult persons residing in the district. The school authorities, if they approve of the plan, should then define and fix the territorial limits within which members of the forum must reside; until details of organization are completed, the superintendent or principal of the school in which the meetings are to be held may act as clerk. The forum is organized in the same manner as literary, debating, or similar societies; a constitution and by-laws are adopted, officers are elected, the number and times of meeting are mapped out, etc.

Some idea of the spirit which animated founders of the forum in the Grover Cleveland school, in Washington, D. C., may be gained from the words of the preamble to their constitution:

Whereas, we, the men and women of the neighborhood about the Grover Cleveland school, have a common and absolute responsibility for furnishing to the youth of this community a worthy and living example of proper civic devotion and a common opportunity to refine and clarify the intellectual life of this community, to the benefit and enrichment of its every member; and

Whereas, to fulfill this obligation and realize this opportunity, it is necessary that there be established in our midst a public or community forum, which shall serve as the medium of our community membership, the place where we may go to school to one another in the understanding of the problems of our life

together, and the instrument of our effective coöperation in the common interests; and

Whereas, the public schoolhouse furnishes the ready and appropriate headquarters for this genuinely public expression,

Therefore, we do organize and establish the Grover Cleveland Community Forum, to be used for the open presentation and all-sided discussion of public questions in the hearing and with the equal participation of the adult citizens of this community.

The Completed Community Center. The founders of the Grover Cleveland Forum were not content to have the movement stop with the organization of an adult association, and as a result of their efforts the Hollis-Johnson Community Forum Bill was drafted and introduced into Congress. This measure is recommended to each local community, to each state, and to the nation as a whole, as furnishing a simple and practical plan for developing an ideal community center. It prescribes the method of organizing the forum, as suggested above, and then provides for the *completed community center*, of which the forum was the basis, as follows:

That whenever a public-school building shall have been established as a community forum under the provisions of this act, and upon request to the board of education so to do by a majority of the adult persons present and qualified to vote at any regular meeting, the said board shall designate such building as a community center for the organized training and recreation of the young people of the community, including such activities as may be requested by the said adult organization and approved by the said board, and shall make all necessary and appropriate arrangements for the convenient and proper use of the building for community-center meetings and activities, at such times as the said adult organization may request and the said board approve.

Those men and women who have given the community-center movement the deepest study believe that the proper official to hold the office of community executive-secretary is the principal of the school whose building is selected for the meetings. He acts as the director of community-center activities, and also as administrative agent for the forum. Provision is made in the Hollis-Johnson measure for this officer and two assistants, and a fixed rate of compensation for services rendered is also specified. Finally, there is a provision for payment of expenses, as follows:

It shall be the duty of the board of education to provide, out of appropriations of public funds authorized for the public schools, light, heat, janitor service, and such other expenses as may be necessary to enable the comfortable and convenient use of public school buildings as community forums and community centers under the provisions of this act.

Practical Uses. The forum programs are of course determined by local conditions, but there is no community to which former President Wilson's words do not apply:

What I like about this social-center idea of the schoolhouse is that there is the place where the ordinary fellow is going to get his innings, going to ask his questions, going to express his opinions, going to convince those who do not realize the vigor of America that the vigor of America pulses in the blood of every true American, and that the only place he can find the true American is in this clearing house of absolutely democratic opinion.

Questions concerning the public health, the upkeep of streets and parks, traffic conditions, and a dozen other topics of local interest are discussed, as well as state, national, and international problems. The young people and the children of the neighborhood find in the adult association a pattern for their own societies, and thus there are organized the various athletic, dramatic, social, literary, and educational clubs, together with supervised summer playground programs. An organization of the older youth of the community for the study and discussion of civic questions is an admirable means of training for citizenship. Moving pictures, lectures, concerts, and other entertainments supplement the various educational features. Finally, on certain evenings, the various groups—children, young people, and their elders—meet together for a harmonious community gathering, a gathering of the great neighborhood family—and that community is happiest which makes the occasion attractive for those in every walk of life. Certainly there is no better way to celebrate the special days—Hallowe'en, Thanksgiving, Christmas, and the rest—than this. On such occasions there can be but one sentiment, expressed in such words as these:

Come close and let us wake the joy
Our fathers used to know,
When to the little old schoolhouse
Together they would go.
And neighbor's heart to neighbor warmed
In thought for common good.
We'll strike that fine old chord again—
A song of Neighborhood. L.L.B.

COMMUTATION OF SENTENCE. See PARDON.

COMMUTATOR. See DYNAMO.

COMNENUS, *kom ne' nus*, ALEXIUS, ruler of the Byzantine Empire at a critical period. See BYZANTINE EMPIRE.

COMO, *ko' mo*, LAKE, in Italian, LAGO DI COMO, one of the famed beauty spots of Northern Italy, is visited yearly by many thousands of tourists and has a large permanent summer population. About sixteen miles long and two and a half miles wide, it lies at the foot of the Alps, which rise to a height of 7,000 feet behind the handsome villas, gardens, and vineyards lining the shores. The River Adda both feeds and drains the lake as it runs through it. The chief town on its shores is Como. See ITALY (Rivers and Lakes).

COMORO ISLANDS, a group of small islands in Mozambique Channel. See MOZAMBIQUE, subhead.

COMPACT OF THE PILGRIMS. The text of this agreement, signed by the heads of the families on the *Mayflower*, is given in the article PLYMOUTH COLONY.

COMPANIONS OF THE BATH. See BATH, KNIGHTS OF THE.

COMPANY OFFICERS, in an army organization. See RANK IN ARMY AND NAVY.

COMPANY OF THE HUNDRED ASSOCIATES. See CANADA (History of Canada: Age of Discovery and Exploration).

COMPARISON (IN GRAMMAR). A French or a German adjective must be plural in form if the noun it modifies is plural, and must take the feminine ending to agree with a noun in the feminine gender. An English adjective, on the other hand, is inflected for one purpose only—to express a greater or a smaller quantity or degree of the quality it denotes. Such variation, which applies also to adverbs, is called *comparison*. The above statement does not include the pronominal adjectives, such as *this* and *that*, which are inflected for number.

The Three Degrees. *Positive.* When we say, "This book is heavy," or "This book is interesting," the adjectives *heavy* and *interesting* are said to be in the *positive degree*. The corresponding adverbs, *heavily* and *interestingly*, are also positive in degree.

Comparative. With two books before us, we may say, "This book is heavier than the other," or "more interesting than the other," and in the descending scale, "less heavy" or "less interesting than the other." *Heavier*, *less heavy*, *more interesting*, and *less interesting*, with the related adverbial forms *more heavily*, *less interestingly*, and the like, are said to be in the *comparative degree*.

Superlative. Among three or more books, we may point out the one which has the highest or lowest degree of weight or interest, saying, "This is the heaviest (or least heavy) book"; "This is the most interesting (or least interesting) book." *Heaviest*, *least heavy*, *most interesting*, *least interesting*, and their corresponding adverbial forms *least heavily*, *most interestingly*, and the like, are said to be in the *superlative degree*.

Where the suffixes *er* and *est* are added to the positive form, it is called *comparison by endings*, and where the adverbs *more*, *most*, *less*, or *least* are prefixed, it is called *comparison by adverbs*. See ADJECTIVES; ADVERBS; INFLECTION.

Irregularly Compared Adjectives. Some of the commonest adjectives are irregularly compared—words that have come down from Old English forms. The following list includes some of these irregularly compared adjectives and adverbs.

POSITIVE	COMPARATIVE	SUPERLATIVE
aft, <i>adv.</i>	after	aftmost, aftermost
bad, ill, evil	worse	worst
far	farther	farthest
forth, <i>adv.</i>	further	furthest
good, well	better	best
hind	hinder	hindmost, hindermost
in, <i>adv.</i>	inner	inmost, innermost
little	less	least
much, many	more	most
near	nearer	nearest, next
nigh	nigher	nighest, next
old	older, elder	oldest, eldest

Adjectives and Adverbs without Comparison. There are many adjectives and adverbs whose meaning is such that it is clearly impossible to compare them without violating the laws of logic; among these are words like *perpendicular*, *square*, *eternal*, *unique*, *perfect*, for instance. Strictly speaking, it is impossible to refer to a thing as *most perfect*. However, the comparatives of many of these words are used; for example, when we speak of an object as the *most perfect*, we mean that the object is the most nearly perfect of any of its kind.

Among the adjectives that, strictly speaking, have no shades of meaning and therefore do not admit of comparison through the use of *more*, *most*, *so*, *too*, *very*, and similar adverbs, may be mentioned the following:

absolute	incurable
annual, daily	infallible
cloudless	infinite
conclusive	lawful
continual	omnipotent
dead, living	perpetual
empty, void, full	right, correct, true
eternal	solid
perfect	square, circular, round
fundamental	triangular
human	unanimous
immaculate, spotless	unique
impossible	universal
inaudible	wrong

Uses of the Superlative. The superlative degree has a wider application than the comparative. It is often employed in the sense of *very*, without implying comparison at all; "His success was *most brilliant*"; "She wore the *quickest clothes*."

In everyday speech, it is common to hear the superlative adjective or adverb used where only two things are compared; as, "Helen is the *prettiest* of the twins." This is incorrect, the proper expression being, "Helen is the *prettier* of the twins."

"Other" and "Else." Before we can use an adjective in the comparative degree, we must have two distinct objects or groups. To compare Robert's height with that of the other boys in his class, we must stand Robert by himself and set the other boys off in a group, to avoid comparing Robert with himself. Then, in expressing the result of such comparison,

we must bring out this idea of *separation* by using some separating word like *other* or *else*; as "Robert is taller than any other boy in his class," not "Robert is taller than *any* boy in his class"; or "Robert is taller than *anybody else* in his class," not, "Robert is taller than *anybody* in his class." If the sentence fails to set Robert apart from the others, it fails to give the two distinct elements that are demanded by the comparative degree.

On a first visit to a great city, a boy or girl should not write, "This city is larger than *any* I have ever seen," but "This city is larger than *any other* I have ever seen."

Common Errors. Many of the errors that appear in the comparison of adjectives and adverbs have been referred to in the sentences that have been given to illustrate the various rules. The following list reemphasizes some of these pitfalls and calls attention to one or two new points:

Brazil produces more coffee than any country in the world, for *Brazil produces more coffee than any other country in the world*. Since Brazil is included in the phrase "any country in the world," the separating word *other* is needed to make comparison possible.

Of all other people, I like him the least, for *Of all people, I like him the least*. The superlative includes the object of the comparison; therefore an excluding word like *other* is out of place.

No metal is so valuable in science as radium, for *No other metal is so valuable in science as radium*. Since radium is one of the metals, it must be excluded from the other term of the comparison.

A more happier couple you never saw, for *A happier (or more happy) couple you never saw*. Double comparatives are as grievous an error in grammar as double negatives.

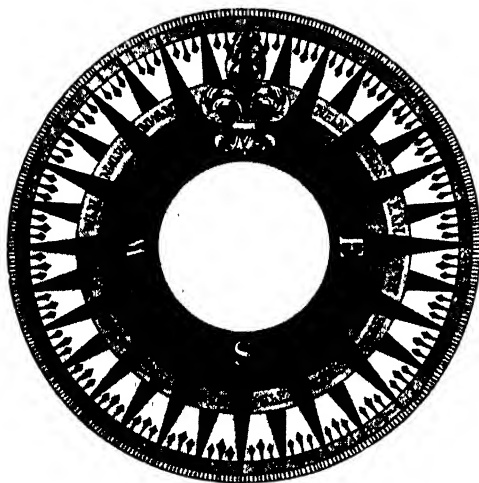
Which is more preferable in your opinion? for *Which is preferable in your opinion?* *Preferable* being in itself a comparative, the prefixing of the adverb *more* produces a double comparative.

This was the most unkindest cut of all, for *This was the unkindest (or most unkind) cut of all*. This line from *Julius Caesar* involved no error in Shakespeare's time, but the grammar of the present day classes a double superlative as an impropriety.

COMPASS, an instrument which in its simplest form consists of a magnetic needle mounted on a pivot, always pointing in the direction of the magnetic north and south poles. Such compasses, very small in size, are often worn as ornaments on watch chains or carried in the pocket by travelers.

On board ship, the most important instrument in use is the *mariner's compass*, a more complicated and accurate instrument; without it, ocean navigation would be in the highest degree dangerous, if not impossible. It consists of a series of magnetic needles supporting a card, known as the compass card, which is mounted on a pivot of steel. The *cardinal points*, north, south, east, and west, are plainly indicated on the card, which is further divided into the *intercardinal points*, northeast, north-

west, southeast, and southwest. The degrees are marked from zero to 360, starting at the north and going round the card in the same way that the hands of a clock move. The



FACE OF MARINER'S COMPASS

combination of card and needles is enclosed in a brass box, and is so pivoted that no matter how much the ship may change its position, the compass card always remains horizontal. As an aid to navigation, the degrees are further divided into points, half points, quarter points, and in some cases even eighth points. If required to steer in a northeasterly direction, the steersman by use of the rudder brings the bow of the ship into a direct line with the point marked N. E. on the compass card and the center of the wheel.

Deviation of the Compass. This term indicates error in direction or pointing of the compass, caused by the magnetism of the ship on which it is placed. Such deviation does not occur to any appreciable extent in wooden ships, unless the cargo contains a large amount of iron. In vessels built of iron, however, the deviation is sufficient to cause a decided error in direction of steering. Some compasses are so delicately adjusted and so sensitive that metal in the pocket of a steersman has been known to cause an appreciable deviation. Compasses used in iron vessels are carefully corrected, and the deviation is noted on charts, so that the navigator can readily calculate the exact direction in which the ship is headed. Sometimes the error or deviation is so slight that mechanical correction of the compass is not necessary. In other cases, however, it is essential that the deviation be counteracted by placing bars of magnetic steel beneath it in such a manner as to cause the compass, when stationary, to point directly toward the magnetic pole. Variations are also caused by the

natural attraction of the earth. The power of such attraction varies in different latitudes. For the benefit of navigators, charts are provided which indicate the natural variations to be expected in all latitudes.

Boxing the Compass, a term applied to ability to repeat the names of all the points, half points, quarter points, and eighth points of the compass, in their proper order. This is an accomplishment required of sailors, especially those called upon to steer vessels. The origin of the term is not known, but it is probably due to the fact that the compass on board ship is contained in a brass box.

Gyroscopic Compass. This is a nonmagnetic compass which utilizes the principle of the spinning disk. It is described under **GYROSCOPE**.

Radio Compass. This is simply a loop aerial similar to those used by owners of home radio sets not equipped with outside aerials. The radio compass is a direction-finder, and is a wireless device that is proving of inestimable value in saving lives at sea. The operator on a ship receiving calls for help turns the aerial until he finds the direction from which the incoming signals are loudest, and then orders the ship to head in that direction. In this way needless delay in reaching the endangered ship is avoided. See **RADIO COMMUNICATION**.

Earth-Induction Compass. This instrument is based upon the measurement of the electromotive force induced by the earth's magnetic field, in a coil that rotates about a vertical axis. It is used especially by airplane pilots. When a course has been set so that the needle registers zero, any deviation from that course causes the needle to move away from zero in the direction of error. The pilot then turns his plane out of course in a direction such that the needle registers error on the other side of zero. When the duration of the second deviation equals that of the first, the ship can be brought back to true position. Colonel Charles A. Lindbergh (which see) relied almost entirely upon an earth-induction compass when he made his voyage across the Atlantic in 1927; when he reached the coast of Ireland he was only two miles out of his course, after flying over 3,000 miles.

Surveyor's Compass. This form of compass, used only on land, consists of a magnetic needle moving over a disk on which, in addition to cardinal and intercardinal points, degrees, minutes, and seconds are marked. The method of use is exactly similar to that on board ship, except that the surveyor's compass is fitted with a system of levels and screws by which its position is ascertained and regulated, so that it may remain perfectly horizontal while in use.

Who Invented the Compass? This is a question that can never be answered. The claim of priority of

use was once advanced in favor of the Chinese, as early as 2600 B.C., but it is now considered that no evidence ever existed to prove this. Five hundred years before the Christian Era, the properties of the magnetic needle were understood; the development of the compass was slow, and not until 1391, when Chaucer in his writings mentions it, was there evidence of a division of the dial of the compass into thirty-two cardinal and intermediate points. E.D.F.

COMPLEAT ANGLER, THE. See ANGLING; WALTON, IZAAK.

COMPLEMENTAL, *kom ple men' tal*, AIR. See BREATH AND BREATHING (Lung Capacity).

COMPLEMENTARY COLORS. See COLOR.

COMPLEX. In modern psychology, this term refers to repressed fears, desires, hates, and other emotional states that are condemned by the higher moral standards of the person harboring them. The repressed ideas may be so deeply hidden that the subject is quite unaware of them, but their existence is made manifest by various nervous states, or psychoses. Such complexes are brought to light by psychoanalysis. More common are those repressions that are completely buried in consciousness, but which could be recalled if the subject desired. Finally, there are the repressions which the subject vainly struggles to keep under control. They are the vices, habits, and weaknesses which he may despise and condemn, but which are repressed only partially, and which make him miserable. The fact of these repressions in the young is recognized as a vital element in modern education. See, in these volumes, MENTAL CONFLICT, A CAUSE OF MISCONDUCT IN THE YOUNG; also, PSYCHOANALYSIS.

COMPOSITE FAMILY, OR COMPOSITAE, *kom poz' ih te*, the largest family of flowering

the composite head of small flowers that forms the characteristic feature of the family. Though once believed to be a single compound flower, the flower head of the composite plant is now known to be a closely clustered group of small florets. There are two kinds of florets, ray flowers, and disk, or tubular, flowers. The ray flowers form the conspicuous outer fringe in the sunflower; the tubular flowers, the inner brown disk. In some composite plants, as the dandelion, there is no distinction between ray and disk flowers; in others, the ray or the disk flowers are wholly absent.

The calyx is variously modified in the composite family to insure distribution of seeds, and may take the form of plumes (as the down of thistles), or of bristles, awns, scales, etc. The winds carry the seed of the plumed thistle, and the fur of animals that of plants provided with barbs [see article SEEDS (Seed Dispersal)]. A very large number of the composite plants are cultivated for ornament, others serve as food, and others are of medicinal value. B.M.D.

Related Subjects. The reader will find in these volumes descriptions of the following composite plants.

Arnica	Daisy
Artichoke	Dandelion
Aster	Endive
Burdock	Goldenrod
Chicory	Lettuce
Chrysanthemum	Sunflower
Cosmos	Tansy
Dahlia	Thistle

COMPOSITION OF MOTIONS AND FORCES. Let the accompanying diagram represent a field with two boys stationed at *a*. If the two kick a football at the same instant, one with a force that alone would drive it to *b*, and the other with a force that would alone drive it to *c*, the ball will move to *d*. That is, the result will be the same as it would have been had the first boy driven the ball from *a* to *b* and then the second from *b* to *d* ($cd=ab$). *ad* is called the resultant of the motions *ab* and *ac*. If the line *ab* represents the direction and magnitude of the force given the ball by the first boy, and *ac* the force and direction given it by the second, then *ad* is called the resultant of the forces *ab* and *ac*. For instance, if *ab* were 40 pounds and *ac* 30 pounds, *ad* would be equal to 50 pounds, since $ad = \sqrt{ab^2 + ac^2} = \sqrt{40^2 + 30^2}$. If *ab* and *ac* represent motions, the above combination represents the composition of motions, and *ad*, which is the path over which the

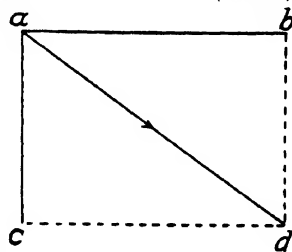


FIG. 1



SOME MEMBERS OF THE COMPOSITE FAMILY

(a) Goldenrod; (b) cosmos; (c) dahlia; (d) sunflower; (e) dandelion.

plants, consisting of more than 12,000 species of herbs and shrubs. The name is derived from

body would move, is called the resultant. If ab and ac represent forces, then the combination is known as the composition of forces, and ad represents in magnitude and direction the resultant force—that is, the single force which, acting alone, could produce the same effect as the forces ab and ac acting together.

Illustrations of this law of forces are common. The principle is frequently employed for supporting objects in a given position. In the second figure is shown a street lamp; ab and cb

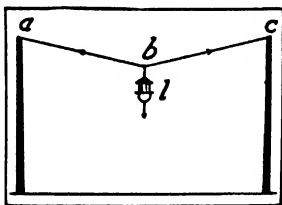


Fig. 2.

are wires extending from standards on the opposite sides of the street, attached to the lamp at b . Three forces are acting upon the lamp; these are gravity, which pulls it down, and ab and cb , which pull toward the standards to which they are respectively attached and unite to produce an upward resultant which supports the weight of the lamp. These forces are brought into equilibrium when the lamp is at l . The resultant for any number of forces acting upon a body may be found by finding it for any two, then for this resultant and a third force, and so on. A simple crane (which see) illustrates the composition of two forces. See, also, PARALLELOGRAM OF FORCES. A.La.F.

Problems. Using Fig. 1 as a diagram, let ab represent a force of 75 pounds and ac a force of 50 pounds. What is the magnitude of the resultant ad ?

Solution. When two forces act at right angles, the resultant can be computed from the proposition that the square of the hypotenuse of a right-angled triangle is equal to the sum of the squares of the other two sides (see TRIANGLE)

In Fig. 1, ab squared plus ac squared equals ad squared; or,

$$75^2 + 50^2 = \text{resultant } (R) \text{ squared.}$$

$$5,625 + 2,500 = R^2, \text{ or}$$

$$8,125 = R^2, \text{ and}$$

$$R = 90.1 +.$$

That is, if forces of 75 and 50 pounds, acting at right angles to each other, are applied to a body, the effect is equal to that of a single force of 90.1 pounds applied to the body. There are many ways of testing of this principle and of verifying the rule given above.

2. Three forces act from the same point: A , 15 pounds north; B , 10 pounds south, and C , 12 pounds west. What is the magnitude of their resultant?

Solution. Since A and B act in opposite directions, their resultant will be $15 - 10$, or 5. The resultant of C and this resultant is the hypotenuse of a right-angled triangle with sides represented by 5 and 12

$$\text{Then } R^2 = 5^2 + 12^2.$$

$$R^2 = 25 + 144 = 169.$$

$$R = 13.$$

Therefore, the effect of the three forces is equal to that of a single force of 13 pounds. (It should be noted that the results are magnitudes and not lengths of sides of triangles.)

COMPOUND, in chemistry. See MOLECULE; CHEMISTRY (Chemical Compounds).

COMPOUND MOTOR. See ELECTRIC MOTOR (Types of Motors).

COMPRESSED AIR. On every hand we see evidences of the fact that air is compressible. The inflated rubber tire that permits the automobile to move along so smoothly, the air gun from which the projectile speeds when the trigger is pressed, and the hand pump that inflates the bicycle tire are but a few of numerous devices that illustrate compressibility of air. A second fact in this connection is that air tends to increase in volume, or expand, when the pressure is reduced. An inflated tire that picks up a nail may explode with great force because

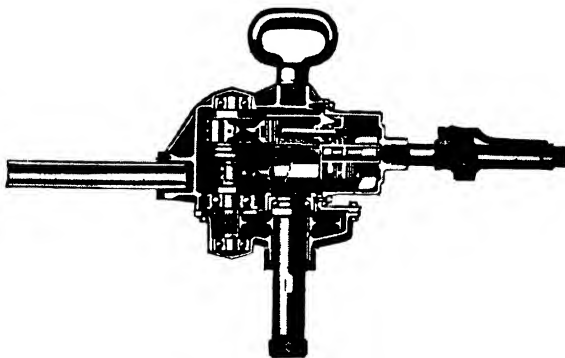
the release of pressure resulting from the hole has caused a sudden expansion of the air, and this blows out the tire.

Air Compressor.

This is a mechanical device for compressing air by forcing it into a receptacle, where it is kept until required for use. The most widely used form of compressor consists of

a cylinder, with necessary valves, in which a piston is worked back and forth by steam or other power. The piston sucks air into the cylinder through one set of valves, which close as the piston commences its return stroke. The strokes of the piston compress the air and force it through other valves into a reservoir, or receiver. From the receiver, the air is sent through pipes to points at which its power is required. Some appliances are so powerful that the compressed air exerts a pressure of many thousands of pounds per square inch.

A rise in temperature always accompanies compression, and the heat generated is often a serious obstacle. Engineers have invented



A COMPRESSED-AIR DRILL

various devices for cooling compressed air, but none is entirely satisfactory. The most common device is that of running cold water through a jacket around the pump cylinder, or around pipes connected to the cylinder, as may be seen at most artificial ice plants. Sometimes heat is transferred to the air by radiation ribs.

Practical Uses. In construction work, tools operated by compressed air usually perform the work of drilling and riveting, and air under pressure is also utilized in ventilating, rock drilling, stone engraving, air painting, sand-blast cleaning, tunneling, in boring holes in concrete, breaking up pavements, operating air brakes (see **AIR BRAKE**), and in other ways. A machine for shearing sheep is operated by compressed air, another device rings the bell on locomotives, and another is used in foundries for tamping the sand in large molds. Drills used by miners in mining coal are usually operated by compressed air. The air serves the additional purpose of helping to ventilate the mines. In Europe, street cars are sometimes operated by compressed air, and the dispatch of mail underground, by means of the pneumatic-tube system, is common there. In America, dispatch tubes are in more general use in stores, hotels, and other large commercial enterprises.

The Air Engine. Attempts have been made to manufacture engines in which compressed air is the motive power, but these have not been very successful. It has been found impossible to get very much power in return for the amount of heat applied, because the expansion of air is so small compared, for instance, with that of water when converted into steam. In the form of motors for producing very small amounts of power, air engines have been found convenient for use on farms, but even here they have proved so inefficient that they are rapidly being replaced by gasoline engines. A.L.F.

COMPRESSION, a mechanical action which produces heat (which see).

COMPRESSIVE STRENGTH. See **STRENGTH OF MATERIALS**.

COMPROMISE OF 1850, a series of measures passed in August, 1850, in the Congress of the United States, for the purpose of allaying the strife between the pro-slavery and anti-slavery factions, by granting concessions to both parties. It contained the propositions (1) that Texas be paid \$10,000,000 to relinquish its claims on New Mexico; (2) that California be admitted as a free state; (3) that the remaining territory obtained from Mexico be organized into the territories of New Mexico (then including Arizona) and Utah, without reference to slavery; (4) that the slave trade be abolished in the District of Columbia; and (5) that the South be granted

an efficient fugitive-slave law. The legislation helped to postpone the War of Secession for a decade. These measures were passed largely through the efforts of Daniel Webster, Henry Clay, and John C. Calhoun.

Related Subjects. The reader is referred in these volumes to the following articles:

Calhoun, John C.	Guadalupe Hidalgo, Treaty of
Clay, Henry	Kansas-Nebraska Bill
Fugitive Slave Laws	Webster, Daniel

COMPTROLLER, *kon tro' lur*, OF THE **CURRENCY.** See **TREASURY DEPARTMENT**.

COMPULSORY EDUCATION. See **EDUCATION** (Modern Tendencies in Education).

COMSTOCK, ANNA BOTSFORD. See **WOMEN**, TWELVE GREATEST AMERICAN.

COMSTOCK LODGE. See **BONANZA**; **NEVADA**.

COMTE, *koNt*, ISIDORE AUGUSTE MARIE FRANÇOIS XAVIER (1798-1857), a French philosopher who founded the system known as *positivism*. The central idea of this philosophy is that the only real knowledge that man can have is the knowledge of things which have objective existence. The disciples of Comte think of him as the founder of a new religion, the religion of humanity, for he taught that all should worship humanity, the "Great Being" of which each one is a part.

The founder of positivism was born in Montpellier, where he received his early schooling. At the age of sixteen, he entered the polytechnique school of Paris and two years later began to earn his living by teaching mathematics. At this time he was an enthusiastic admirer of the life of Benjamin Franklin, and, in imitation of the great American philosopher, "formed the design of becoming perfectly wise." In 1818 he came under the influence of Saint Simon, who suggested to him the basic ideas on which his own system rests.

The key to the philosophy of positivism is what Comte called the Law of Three States—that men's thoughts show three stages of development. In the first period, the *theological* stage, they believe that divine beings produce all phenomena; in the second, the *metaphysical* stage, they believe that abstract forces, either mental or physical, are the cause of all activity; in the third, the *positive* stage, they cease to inquire into the causes of phenomena and confine themselves to things about which they have actual knowledge. After 1848 he lived on a fund raised by public subscription.

These Books Developed His Theories. Comte wrote six volumes of a *Course of Positive Philosophy*, an introduction to his *System of Positive Polity*. See **SOCIOLOGY**.

CONCEPCION, *kon sep se ohn'*, a city in Chile (which see).

CONCEPT, *kon' sept*. A concept is one's idea of a class of objects, expressed by common nouns without modifiers, as *cat*, *horse*, *house*.

If I say *the cat*, I usually refer to one particular cat. If I say *a cat*, I mean *one* cat, but not any particular cat, while the word *cat*, without any limitation, means *all* cats. For this reason, a concept is called a *class*, or *general idea* or *notion*. See **THOUGHT**.

Concepts are formed by the child as a result of direct observation. That is, he arrives at the general idea *cat* by the observation of many cats. His first idea of cats is that of his own pet kitten; it includes size and color. Repeated observations stamp the picture of the kitten on his memory. When he sees another cat of different size and color, he may at first think it to be some other animal, but he soon learns that it also is a cat. He then reconstructs his idea and omits from it those qualities not common to both cats, such as size and color. One cat may be black and the other white; one may be small and the other large, but both have round heads, pointed ears, a long body, four legs, and a tail. The child soon learns that all cats have these characteristics, and he blends them all into his general idea (concept) *cat*. All concepts are formed by a similar process.

The formation of concepts is an essential step in mental development. Since all concepts are formed from ideas of individual objects gained through observation, their accuracy depends upon the accuracy of one's observations. Teachers and parents should therefore help children to observe objects carefully and accurately. Clear concepts are essential to clear thinking. C.E.S.

CONCERTINA, *kon sur te' nah*, an improved form of accordion, invented by Charles Wheatstone in 1820. Usually six-sided, this instrument is composed of a bellows with two ends, on which the stops or studs are placed. It is held between the hands so that the fingers fall naturally on these studs, and the performer so operates the valves that air is admitted to the metallic reeds, and sounds are produced. As there are two tongues or reeds for each tone, sound may be produced by pulling the bellows open or pressing them together. Including chromatic tones, the range of the instrument is from the lowest violin *G* to the *C* three and one-half octaves higher. Concertina music is artistic and beautiful when played by a skilled performer. See **ACCORDION**.

CONCERTO, *kone chehr' toh*, a composition of the same class as the sonata, but written specially for a solo instrument, such as the piano or violin, and designed to be played with the accompaniment of an orchestra. It consists of three or four clearly developed movements, composed according to definite rules of form. Occasionally, concertos are written for more than one instrument, and may then be played without accompaniment. Beethoven's triple concerto for piano, violin, and

cello is an illustration of this form of concerto. See **MUSIC**; **SONATA**; **BEETHOVEN**.

CONCESSIONS IN CHINA. See **CHINA** (History: The Republic).

CONCH, *konk*, from a Greek word meaning *shell*, or *shell-like*, is applied to a large and useful mollusk of tropical waters, found abundantly in the West Indies and on the coast of Florida. It has a heavy spiral shell, which is used for many purposes. Conch shells are ground up for porcelain-making, burned into lime, and used as ornaments. Many of them, with the ends broken off, have been used as dinner horns on Southern plantations. From some conchs inferior cameos are cut (see **CAMEO**). The pink Bahama conchs furnish the valuable "conch pearls." Others are used in button-making, and in the East Indies the shell of one species serves as a musical instrument. The animal itself is sometimes eaten. The poorer people of Southern Florida and near-by islands once used these mollusks for food and collected them for sale. The egg cases of the conch look like leathery circles strung upon a cord, and have been called "sea necklaces." See **MOLLUSKS** S.H.S.



Photo Visual Education Service

CONCH SHELLS

CONCHIOLIN, *kon ki' o lin*. See **PEARL**.

CONCLAVE, *kon' klave*, an assembly of people meeting privately, though originally the word related solely to the assembly and place of meeting of cardinals of the Roman Catholic Church for the election of the Pope. In historic significance, the word applies to the latter event. The word in French or Latin means a *room which may be locked*.

Long ago Popes were chosen by the clergy and the people, but elections frequently were attended by confusion. In the Council of Lyons, in 1274, the present method was developed. Ten days after the death of a Pope, the cardinals meet in the city in which he died. A large hall is divided into small rooms, three of which are given to those of princely rank, two to each of the ordinary cardinals. The first day the meeting-place may be viewed by

the public, but thereafter the cardinals are locked in and allowed no communication with the outer world until after the election. Their food is prepared in the same building.

The conclave in Rome in July, 1903, the first in which a United States cardinal participated, resulting in the election of Pius X, lasted but five days; in 1914 Benedict XV was chosen as his successor in four days, the shortest conclave on record. Some conclaves in the past have lasted for months. See POPE; CARDINAL.

CONCORD, MASS. See MASSACHUSETTS (back of map).

CONCORD, N. C. See NORTH CAROLINA (back of map).

CONCORD, N. H. See NEW HAMPSHIRE (back of map).

CONCORDAT, *kon kawr' dat*, in the affairs of the Roman Catholic Church, an agreement between the Pope and a secular government for the settlement and regulation of affairs of the Roman Church within that state. It may be proclaimed in the form of a Papal bull, or edict, or it may be by formal treaty. There have been many famous concordats in history, but as the principle of the separation of Church and State has gained ground, such instruments have become of less importance. However, Pope Pius XI concluded an important concordat with Mussolini in 1929, designed to regulate all future relations between the kingdom of Italy and the Vatican, and establishing again the temporal power of the Papacy over a small area. The abrogation of a concordat by a nation does not necessarily entail the separation of Church and State in that country, or the rupture of diplomatic relations with the Vatican. See TREATY; PAPAL STATES.

CONCRETE, *kon' kret*, an artificial stone so widely employed as a building material that the present period might well be called the "age of concrete." Where strength and durability are both required, concrete is a construction material second to none, for when properly made, its inherent strength increases with wear, and it grows stronger and not weaker with age. This is a quality possessed by no other building stone.

Concrete is a mixture of portland cement (described in these volumes under CEMENT), water, and inert materials such as sand and pebbles, or crushed rock, or crushed slag. These inert materials are spoken of as aggregates. In the mixture, the cement and water form a paste that, upon hardening, acts as a binder, welding the inert particles into a stonelike mass. The mix is placed in forms, or receptacles, for hardening while in a plastic condition, and has to be worked with spade, trowel, or other implement to insure proper settling of the stony particles and the formation of a smooth surface.

The production of a satisfactory grade of concrete is not a matter of chance or guesswork.

Thousands of experiments, with the product subjected to every possible test, have given manufacturers reliable information as to correct proportions of materials. These proportions vary according to the nature of the work for which the concrete is intended, but in every case it is essential that the correct amount of water be used per sack of cement, and an opportunity be given for the chemical reactions incident to hardening to be completed. An example will make these points clear.

Suppose a person wishes to determine the proper amounts of materials for building a concrete cistern. He consults a table of recommended mixtures for different classes of construction, and finds that this particular job calls for 5½ gallons of water for one sack of cement, provided the sand and pebbles are dry. If they are moist, he need add but 4½ gallons of water, and if they are dripping wet, only 3½ gallons are required. The table also specifies that the trial mixture for this job is one sack of cement to two cubic feet of sand and three cubic feet of pebbles.

Preparing a trial batch is necessary to determine the workability of the mix. A workable mixture is one of such plasticity and degree of wetness that it can be placed readily in the forms, and that with spading or tamping will result in a dense concrete. In such a mixture, there is enough cement-sand mortar to give a good, smooth surface, free from rough spots, and to bind the pieces of coarse aggregate into the mass, so that they will not separate out in handling.

The first trial batch may be too stiff, or it may be too wet, for the class of work intended. In our hypothetical case, the builder will change his proportions of sand and pebbles if he finds the batch below the standard of workability, adding to these materials if the mix is too wet, and reducing the proportions if the batch is too stiff. Under no circumstances, however, will there be a variation from the ratio of water to cement as given in the table, and in all cases he will allow ample time for the cement to harden properly, before he exposes his finished job to the drying action of sun and wind. He will keep his structure wet for a minimum of one week; two or three weeks will be still better.

The importance of maintaining a constant water-cement ratio is based on the fact that, so far as proportioning of the ingredients is concerned, this ratio determines the strength of the concrete. The results of thousands of experiments attest the truth of the following principle, universally accepted as the scientific basis of good concrete manufacture:

For given materials and conditions of handling and curing, the strength of concrete is determined solely by the ratio of the volume of mixing-water to the volume of cement, so long as the mixture is plastic and workable.

By curing is meant the gradual hardening and conditioning of the product under controlled states of temperature and moisture, due to the chemical reactions between the cement and water. Concrete must not be permitted



A BEAUTIFUL BRIDGE OF CONCRETE

It is the Colorado Street Bridge, in Pasadena, Calif

to dry out, because it acquires its full strength only if it hardens in the presence of water. For this reason, newly laid surfaces are protected from sun and wind during the initial hardening period, in order that they may not lose moisture by evaporation. The material acquires sufficient strength for ordinary work within twenty-eight days after having been placed, provided it has been protected from drying out and from low temperatures. Additional curing, however, builds up additional strength and wearing quality over an indefinite period of years.

The selection of materials is also an important factor. Sand should be clean, hard, and free from fine dust, loam, clay, and vegetable matter. These impurities prevent adhesion between the cement and hard particles of sand; they reduce the strength of the mixture and make it porous. Concrete made with dirty sand hardens so slowly that the finished product may never be serviceable for the purpose intended. There is small likelihood of there being a poor product because of a low grade of cement, for that material is manufactured under rigid supervision, in order to meet standardized specifications.

Concrete Construction. Concrete is so easily adapted to all sorts of construction purposes that its use has been widely extended, especially since the beginning of the present century. On the modern farm, this strong, durable material is serviceable for foundations of buildings, water tanks, septic tanks, cisterns, granaries, and storage pits that must be fireproof and vermin-proof, silos, manure pits, fence posts, and many other structures. Engineers use concrete for the construction of piers, abutments and superstructure of bridges, for dams, and for the lining of tunnels. Architects employ it for dwellings and apartment houses,

factories, office buildings, stores, and various other structures. It is used in the building of thousands of miles of city streets, country roads, and sidewalks.

It can be run into molds for making ornamental work, made into blocks for the construction of dwelling houses, and built into solid walls for large buildings, grain elevators, bridges, dams, foundations, and fortification walls. The fortifications of New York harbor and the foundations for the great guns behind them are of concrete, and the locks of the Panama Canal are of this same material.

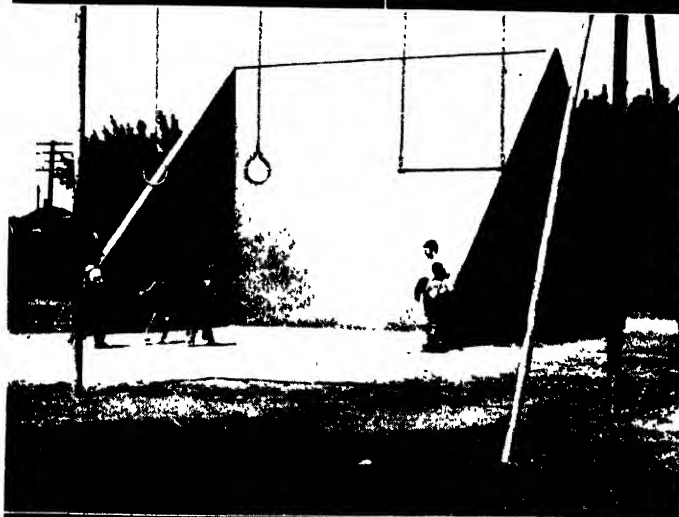
Reinforced Concrete. Concrete can resist great pressure, but will be forced apart under a heavy pull. In the article BRIDGE will be found an illustration showing that a beam may break by pulling apart on the under side. For this reason steel rods are anchored in the walls and floors of a concrete building before the concrete is placed in the forms; the rods are thus buried in the concrete, and prevent pulling apart. For strengthening floors, two sets of rods are used, those of one set crossing those of the other at right angles. In the construction of pillars, a sort of frame consisting of vertical rods and hoops is used. The steel work is put in place, and the concrete is poured around it. When the cement hardens, a firm, strong structure is the result.

Concrete Blocks. Bricks, blocks, and tile are made of concrete, and are widely used in industrial and mercantile buildings, as well as in dwellings and smaller structures. The block and tile are usually hollow, so that walls built with them have a dead-air space which keeps out cold and dampness.

Mixing the Concrete. For small structures, the mixing may be done by hand, the workmen using shovels, but for most work mixing machines are employed. These are often large machines, with automatic devices for measuring the sand and stone and adding the correct quantity of water. They mix the material very thoroughly.

Completing the Structure. Forms for holding the semi-fluid concrete are first put in place. They may be of wood or steel, but must be so constructed that they can be removed easily when the concrete has set and become hard. The concrete is taken from the mixer in wheelbarrows, carts, cars drawn by locomotives, elevators, or other devices, and carefully placed in the forms. In the construction of high buildings, elevators or endless belts to which buckets are attached are used for carrying the concrete to the upper stories.

Concrete Roads. The wide extension in the use of motor vehicles has created a nation-wide demand for good highways, and concrete is being used more and more in the construction of hard-surfaced roads in the country districts. It is also widely used for city streets. The ad-



Unusual Concrete Forms. (1) A wading pool in Tulsa, Okla. (2) Stand for sundial, New York City. (3) Container for plants, in Minnesota. (4) Handball court, Spokane, Wash. (5) Lamp post, Beverly Hills, Calif. (6) Private swimming pool, Cedar Rapids, Ia.

vantages of concrete roads are obvious. They wear well, even under heavy traffic; their smoothness of surface makes for economical operation of motor cars; their gray color is easily distinguished by day or night; and they have excellent tractive quality. See **ROADS AND ROAD BUILDING**. J.B.M.

CONDE. See **HUGUENOTS**.

CONDEMNATION PROCEEDINGS. See **EMINENT DOMAIN**.

CONDENSER. See **DISTILLATION**.

CONDENSITE. See **BAKELITE**; **CARBOLIC ACID**.

CONDIMENTS. See **ADULTERATION OF FOODSTUFFS AND CLOTHING** (Condimental Foods).

CONDOR, the name of certain large species of vulture. Keen of sight and smell, wonderfully graceful in flight, condors inspire both admiration and repulsion, for their eating habits

wrinkled, reddish neck is relieved by a downy ruff of white feathers, and the male wears, in addition, a comb and wattles of red skin. The females are somewhat smaller than the males. These condors eat all kinds of carrion, but they also attack sick and helpless animals, and will gorge themselves until they are too heavy to fly. Because of their raids on the sea fowl along the Peruvian coast, they are being slaughtered by the Peruvian government, in order to protect the guano deposits (see **GUANO**). Plumage-hunters are also diminishing their numbers.

The California condor is now confined to the San Bernardino Mountains of Southern California. Efforts are being made to prevent the extinction of this great bird, which has been the victim of poison baits designed by settlers to kill off wolves and pumas. It is about the size of the Andean condor, and its plumage is likewise a mixture of black and white, but instead of a downy ruff, it wears a fringe of black feathers on the back of the neck. It raises but one nestling at a time. See **VULTURE**. D.L.

Scientific Names. Condors belong to the family *Cathartidae*. The South American species is *Sarcophagrus gryphus*; the California, *Gymnogyps californicus*.

CONDOR, standard coins of Colombia, Ecuador, and Chile. See **MONEY** (Foreign Monetary Standards).

CONDUCTION. See **HEAT** (How Heat Travels).

CONDUCTIVE ANESTHESIA, *kon duk' tiv an es the' si ah*. See **DENTIST**.

CONDUCTOR, **ELECTRICAL**. See **ELECTRICITY** (Conductors and Non-Conductors).

CONDUIT, *kon' dit*. See **SEWAGE AND SEWERAGE**.

CONE, *kohn*, a solid whose base is a circle, and whose convex (outward-curving) surface tapers uniformly to a point called the *vertex*.

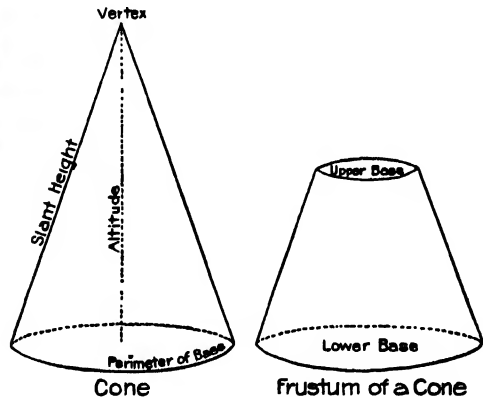


Photo: Wide World

CALIFORNIA CONDORS

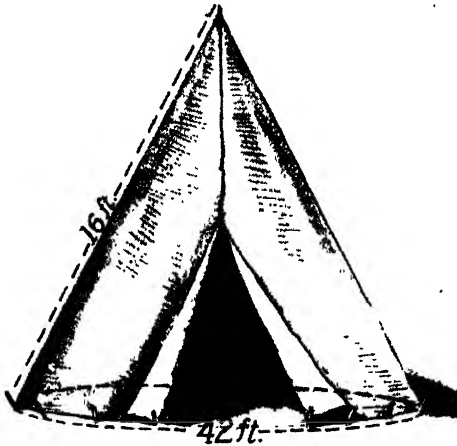
are disgusting. The best-known species is the South American condor, a bird that nests high in the Andes, over two miles above sea level. Its nest is a loose collection of sticks placed on bare rock, and it lays two large white eggs. This condor has an average wing spread of nine or ten feet, but in large specimens the spread may reach eleven feet. Among creatures of the air, only the nearly extinct condor of California equals this bird in size.

Both males and females have glossy black plumage and ashy wing patches. The bare,



The cone generally used in practical problems is the *right circular cone*, in which the line drawn from the vertex to the center of the

base is perpendicular to the base. The perpendicular distance from the vertex to the center of the base is called the *altitude* of the



cone; the distance from the vertex to a point of the base-circle is its *slant height*. The *frustum* of a cone is the portion left after the top is cut off on a plane parallel to the base.

Rules and Problems. (1) The volume of a cone is equal to one-third the volume of a cylinder which has its base equal to the base of the cone, and its altitude

(b) Fill the cone with sand; fill the cylinder with sand. Weigh them. How do their weights compare? (1 to 3.)

(2) The volume of a cone equals one-third the product of the base and altitude.

(a) If the altitude of a tent is 14 feet and the area of the ground space is 153.9384 square feet, how many cubic feet of air would it contain?

(3) The area of the lateral surface (all of the surface but the base) equals the circumference of the base multiplied by one-half the slant height.

(a) John and Harry made a tent. The ground space which it covered had a circumference of 42 feet, and the slant height was 16 feet. How many square feet of canvas did they use?

(4) To find the volume of the frustum of a cone, multiply one-third of the altitude by the sum of the areas of the two bases plus the square root of their product.

(a) How many gallons of water are there in a tank having the shape of a frustum of a cone, whose altitude is 6 feet and whose top and bottom are respectively $20\frac{1}{2}$ square feet and 27.04 square feet in area? Use 231 cubic inches to the gallon.

The problem last given suggests the practical value of the mathematics of a cone. Given a vessel in the form of a cone or frustum, its contents in gallons or bushels may be determined by dividing the number of cubic inches in its contents by the number of cubic inches in one gallon or bushel. See GALLON; BUSHEL.
J.W.Y.

CONE-BEARING TREES, OR CONIFERAE, *ko nif' ur ee*, a large and interesting division of trees and shrubs comprising the most important group of those plants that have naked or exposed seeds—the *gymnosperms* (which see). One distinguishing character of the conifers is that they bear a cone-shaped,



VARIATIONS IN CONES AMONG THE CONE-BEARERS

equal to the altitude of the cone. This can be observed from the following experiments:

(a) Make a cone and a cylinder, of equal base and altitude, of strong paper. Fill the cone with salt, sand, or sugar. Empty its contents into the cylinder. Continue this until the cylinder is filled. How many times did you empty the cone of sand into the cylinder to fill the latter? (Three times.)

scaly fruit. While the fruit in some conifers is modified to form a berrylike structure, the "berry," if examined closely, will be seen to have scale tips on the outside, and the seeds will show the naked ovules of the typical cone-bearers. Authorities are not wholly agreed on a method of classifying these trees, but the

following is a simple and satisfactory division that finds general acceptance: The conifers are made up of two families, the *Pinaceae*, or pines, and the *Taxaceae*, consisting of the yews and related species. In the yews and their allies, the fruit is very much modified from the cone form. To the *Pinaceae* belong the pines proper, the firs, hemlocks, junipers, cedars and spruces, the redwoods and sequoias, the larches and cypresses.

In addition to bearing cones, most conifers are evergreen trees; that is, their leaves do not all fall at one period, like those of maples and oaks, but undergo such gradual replenishment that the trees are still clothed in green in winter. There are some plants, such as the rhododendrons, that are evergreens and not conifers. On the other hand, the bald cypress and the larches, though conifers, are not evergreens, but lose their foliage in the manner of deciduous trees (which see). We can say of conifers, therefore, that they are typically evergreen in habit, but not universally so.

The wind plays an important part in the life of cone-bearing trees. It carries the abundant supplies of light, powdery pollen from tree to tree to effect fertilization, and it bears the winged seeds to new environments. Some species are widely scattered; others, like the redwoods of California, are found only in certain localities. In some species, the seeds are long in ripening, and the scales cling firmly together until the seeds are ready for their journey.

Commercial Value. Besides furnishing the most valuable timber trees, the conifers also produce vast quantities of resin, pitch, turpentine, and tar, and the products of some are medicinal. In the lumbering industry, the cone-bearers have ever held first place, owing to the lightness and durability of the wood, the ease with which it can be worked, and also to the very many uses to which the lumber can be put. The extent of the lumber industry is best told in articles bearing upon each particular species, and to these the reader is referred.

G.M.S.

Related Subjects. The reader is referred in these volumes to the following articles:

Cedar	Lumber
Cypress	Pine
Evergreen	Seeds
Fir	(Seed Dispersal)
Hemlock	Sequoia
Juniper	Spruce
Larch	Yew

CONESTOGA, *kon es toh' gah*. See INDIANS, AMERICAN (Most Important Tribes).

CONESTOGA WAGON. See PENNSYLVANIA (Transportation); illustration, page 7238.

CONEY, *ko' nie*, ISLAND, famous in history as the place where Henry Hudson (which see) landed in 1609, is a popular New York seaside resort, where sweltering thousands from the great city and the surrounding country seek

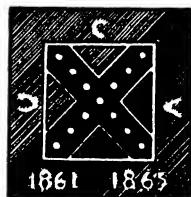
pleasure and relief from the heat during the summer months. It is nearly five miles long and at the widest part is about three-quarters



LOCATION OF CONEY ISLAND

of a mile across, is at the southwestern end of Long Island, nine miles from the south end of Manhattan Island, and is reached by boat, trolley, subway, or elevated train. Sometimes a hundred thousand people in one day visit "Coney" to swim, play on the beaches, hear the music, dance, or join the throngs of jostling merry-makers at the hundred or more bizarre exhibitions, or take thrilling mechanical rides. Close at hand are Brighton, West Brighton, Sea Gate, and Manhattan Beach resorts.

CONFEDERATE ARMY SOCIETIES, patriotic organizations of the South which, like the Grand Army of the Republic and other societies of the North, were formed to preserve the memories of the War of Secession. The first of these was organized at New Orleans, La., in 1889. Composed of veterans of the Confederate army or navy, it is known as the



Forms of lapel buttons of the United Confederate Veterans.

UNITED CONFEDERATE VETERANS. Its purpose, besides strengthening friendships formed during the war and preserving the memory of dead comrades, is to aid veterans, their widows and orphans.

In 1894 the UNITED DAUGHTERS OF THE CONFEDERACY was organized in Nashville, Tenn., by widows, wives, mothers, and sisters of those who served honorably in the Confeder-

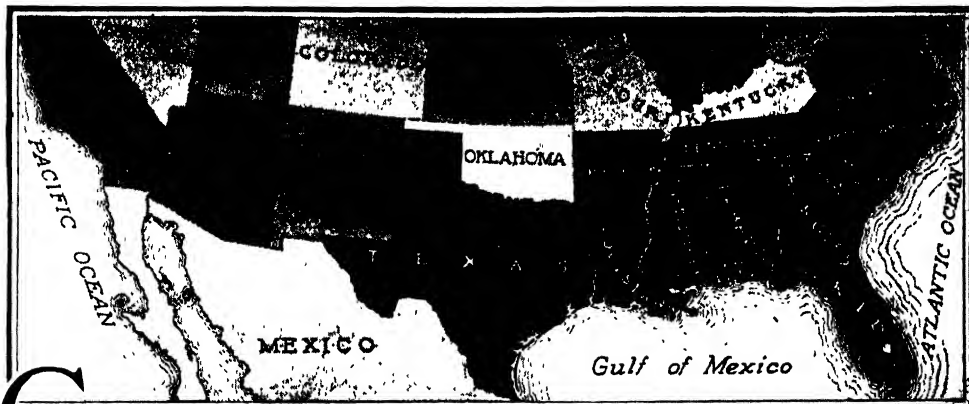
ate army or navy. Its purpose is to honor Confederate soldiers, living or dead, and like the Veterans, to help Confederate soldiers and sailors and their families when in need. Its chapters have helped to establish homes for poor Confederate veterans and their families, have conferred crosses of honor, scholarships, medals, and prizes, and have done numerous other worthy deeds.

In 1896 the male descendants of Confederate veterans whose records were honorable organized the society of the UNITED SONS OF CON-

FEDERATE VETERANS at Richmond, Va. Its chief purpose is the gathering and preserving of historic relics and data from which to write a history of the War of Secession from the Southern standpoint, although it, too, is a benevolent society. In 1900 Beauvoir, the home of Jefferson Davis, was purchased by the society as a home for soldiers.

CONFEDERATE MEMORIAL. See **STONE MOUNTAIN.**

CONFEDERATE SOLDIERS' HOME. See **SOLDIERS' HOME.**



CONFEDERATE STATES OF AMERICA. In 1860 and 1861, eleven of the Southern states of the American Union withdrew from the United States, because of differences of opinion on the question of negro slavery, and organized a government of their own, which they called the CONFEDERATE STATES OF AMERICA. South Carolina took the lead in the movement, passing its ordinance of secession December 20, 1860. In January, 1861, four other states—Mississippi, Florida, Alabama, and Georgia—followed, and on February 1, Texas joined their ranks.

This withdrawal from the Union was not a new idea, neither had the thought always been confined to the Southern states. It was implied in the Kentucky and Virginia Resolutions, and also openly advocated by the New England states during the War of 1812. It was again brought forward in the Nullification ordinance of South Carolina in 1832. In 1860 the idea was put into far-reaching effect. (For causes, see **WAR OF SECESSION.**)

Organization. On February 4, 1861, delegates from the states that had then seceded met at Montgomery, Ala., and organized a provisional government. This became the permanent government after a Constitution was adopted. Jefferson Davis of Mississippi was elected President, and Alexander H. Stephens of Georgia was chosen Vice-President, for one year, and Montgomery was made the

temporary capital. After Virginia joined the Confederacy, the capital was removed to Richmond. The Constitution was modeled after that of the United States, but differed from it in the following important particulars:

1. The term of the President and Vice-President was fixed at six years, and the President could not succeed himself.
2. Members of the Cabinet were given seats in Congress, with the privilege of debate, but without the right to vote.
3. Foreign slave trade was prohibited, but slavery was sanctioned.
4. Congress was forbidden to make appropriations for internal improvements, to levy a protective tariff, or to give bounties.
5. A two-thirds vote of both houses of Congress was necessary to admit a new state into the Confederacy or to make appropriations not asked for by the heads of departments through the President.

President Davis and Vice-President Stephens were elected for a full term of six years before the expiration of their provisional terms. The first Cabinet was composed of six men, remarkable for their foresight and ability. With the progress of events, changes were made, and during the life of the government a number of other names were added. The following is a complete list of the first members, with the dates of their deaths:

Judah P. Benjamin, Louisiana, Secretary of State, died May 8, 1884; Charles G. Memminger, South

Carolina, Secretary of Treasury, died March 7, 1888; George W. Randolph, Virginia, Secretary of War, died April 10, 1878; Stephen R. Mallory, Florida, Secretary of Navy, died November 9, 1873; Thos. H. Watts, Alabama, Attorney-General, died September 16, 1892; John H. Reagan, Texas, Postmaster-General, died March 6, 1905.

Border States. The Confederate States hoped for a peaceful withdrawal from the Union, and influential men on both sides of



CAPITOL BUILDING

The building in Richmond which served as the Confederacy's capitol.

the controversy exerted themselves to the utmost to prevent war, but without success. War actually began with the attack on Fort Sumter, April 12, 1861. The fall of the fort was immediately followed by a call for 75,000 volunteers by President Lincoln. Both sides made strong efforts to secure the support of the states lying between those forming the Confederacy and the Ohio River, and also of Missouri, Arkansas, Louisiana, and Texas. Of these North Carolina, Virginia, Tennessee, Arkansas, Louisiana, and Texas joined the Confederacy. The Federal government secured control of Delaware, Maryland, Kentucky, and Missouri before the Confederate sympathizers in those states could organize. The state of West Virginia was formed from that part of Virginia whose inhabitants were in sympathy with the Union.

Foreign Relations. As soon as the government was established, representatives were sent to Europe to secure the recognition of the Confederate States of America as an independent government. Before this was done, however, England had recognized the Confederacy as a belligerent, and France, the Netherlands, Spain, Brazil, and a few other nations did the same. This recognition of the South gave the Confederate vessels on the high seas the same privileges in the ports of those nations as were granted those of the United States, but it did not grant the privilege of sending representatives to those governments; before that privilege could be secured the fall of Vicksburg and the Union victory at Gettysburg compelled the

Confederacy to give up all hope of securing recognition as an independent government.

Financial Measures. Lack of funds was the greatest handicap of the Confederate government. It began without a national treasury and with only a small public fund, but the latter was considerably increased by private donations and by the sale of bonds. But the government was soon obliged to resort to issuing paper money, whose volume increased so rapidly that, some months before the end of the war, it was practically valueless. Without funds it was impossible to maintain the army in such a degree of efficiency as would enable it to withstand the repeated onslaughts of the Federal forces.

Heroic Efforts. At first, success was with the Confederacy, and after the defeat of the Union forces at Bull Run and Fredericksburg, several attempts were made by European powers to end the war by persuading the contending nations to make a treaty of peace, but these efforts failed. The resources of the North were greater than those of the South. Moreover, all Southern ports were in a state of blockade, so goods could not be shipped into or out of the Southland. The North was able to keep its army supplied with ammunition, food, and clothing, while the army of the South was often without supplies. But the Southern soldiers willingly continued to defend the cause they had espoused, though suffering from hunger and cold, and lacking in arms and ammunition.



Photo Visual Education Service

THE PRESIDENT'S MANSION

Official residence of Jefferson Davis, as President, in Richmond.

The Confederate Congress held two sessions, and then it adjourned. The great responsibilities resting upon President Davis made it necessary for him to resort to arbitrary measures to carry on the government, but amidst all these discouragements he held the Confederacy together until the fall of Richmond. With the surrender of the Army of Northern Virginia on April 9, 1865, the government of

the Confederate States of America came to an end; not ingloriously, as some thought at the time, but as the yielding to a superior force by a brave, consecrated people.

That they, the vanquished, regained in full measure the esteem of the victors is expressed in the following lines:

Under the sod and the dew,
Waiting the Judgment day,
Love and tears for the blue;
Tears and love for the gray.

Related Subjects. The reader is referred in these volumes to the following articles.

Davis, Jefferson	Nullification
Emancipation Proclamation	Stephens, Alexander H
Fort Sumter	Trent Affair
Kentucky and Virginia	United States (History)
Resolutions	War of Secession

CONFEDERATION, *kon fed er a' shun*, ARTICLES OF. See ARTICLES OF CONFEDERATION.

CONFEDERATION IN CANADA. See CANADA (History: Confederation).

CONFIRMATION. See ROMAN CATHOLIC CHURCH.

CONFUCIUS, *kon fu' shi us* (551-478 B.C.), a famous Chinese sage whose moral teachings, after nearly twenty-five centuries, are still the religious principles of millions of his countrymen. He was not the founder of a religion, in the sense that Christ and Mohammed established faiths, for he had nothing to say of man's relation to a Supreme Being, but as a teacher of practical morality he was one of the most influential men who ever lived. Confucius was born in Shantung, a province of the state of Lu, and was the son of a soldier of royal descent. His father, commander of one of the districts of the province, died when his son was three years old, and though the family was left with very little money, the mother of Confucius educated the boy according to the best ideals of the time. One of the stories told of his childhood is that he was extremely fond of dressing himself in strange garb and conducting religious services, with his playmates as worshippers.

Confucius began his life work as a teacher at the age of twenty-two, three years after his marriage. He seems to have parted from his wife and children about this time. For the rest of his life, a period of fifty years, during which he traveled widely in China, he endeav-

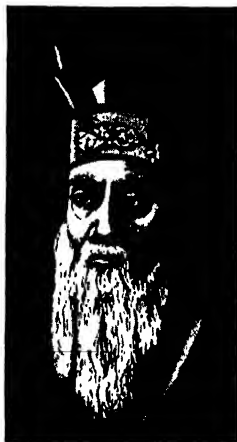
ored to teach others his ideas of what is good. By the time he was thirty, he had worked out the precepts for which he is remembered, and four years later his first pupils of importance came to him. At this point in his career, he had several interviews with Lao-Tse, the founder of Taoism (which see); Confucius, the practical thinker, was much more profoundly impressed with Lao-Tse, the dreamer, than Lao-Tse was with his visitor.

About the year 500 B.C., Confucius was appointed governor of the city of Chung-tu, in his native state of Lu, and shortly afterward was made minister of crime. As a magistrate he showed such sagacity and practical ability that he roused the jealousy of the governor of the neighboring state of Tsi, whose interference so lessened his authority that he resigned four years later. For the next thirteen years, he wandered about from place to place, returning to Lu in his sixty-ninth year, and spending the last five years of his life in retirement. Before he died, he had compiled and edited the ancient Chinese writings, which are included in the *Five Classics*; with these are grouped the *Four Books*, written by his disciples. The nine books together constitute the Confucianist bible.

Confucianism. The system of religion which was worked out by Confucius, known as *Confucianism*, is lacking in spiritual elements. He concerned himself neither with a god nor with the immortality of the soul, but urged men to live righteously while they were in the present world. Goodness, he said, should be practiced for its own sake and not because of a future reward. He emphasized man's duty to his fellow men rather than to a Supreme Being, especially his duty to his parents. Had Confucius written the Ten Commandments of the Mosaic Law, he would doubtless have given the highest place to the one beginning, "Honor thy father and thy mother." Respect for parents has now become one of the very roots of Chinese character, and in the filial devotion of the people we see one of the strongest traces of the influence of Confucius. Submission to the state was another of his important doctrines.

The great teacher laid down for his pupils a negative form of Christ's Golden Rule—"Do not do unto others that which you would not like to have them do unto you." His sayings were collected by his followers, and they form a set of proverbs that are full of practical wisdom and good sense. Among them are such maxims as "To see the right, and not to do it, is to be a coward," and "Not to withdraw after making an error is itself a new error."

After the death of Confucius, he was given the honors due a god, and ceremonies were instituted to perpetuate his teachings, thus making Confucianism practically a state religion. In 1914, after a period in which religion was overshadowed by the revolution which changed



CONFUCIUS

the empire into a republic, there was an unsuccessful attempt to reestablish Confucianism as the state religion. It has nearly 300,000,000 followers. See CHINA (Religion); RELIGION, and references there given.

CONGAREE, *kong ga re'*, **RIVER**. See SOUTH CAROLINA (Rivers).

CONGLOMERATE, *kon glom' ur ate*, is a rock formed by the cementing together of pebbles and boulders of other rock by lime, iron, silica, or some other substance. When conglomerate contains a large number of small pebbles, it is called *pudding stone*, from its resemblance to plum pudding. When broken, angular fragments of rock are cemented together, the rock is called a *breccia* (Italian for *pebble*). When made up of angular fragments of volcanic rock cemented by lava, it is an *agglomerate*. A.J.

CONGO, BELGIAN. See BELGIAN CONGO.

CONGO RIVER, one of the largest rivers in the world, its volume of water being exceeded only by that of the Amazon. It drains a vast



COURSE OF THE CONGO

The small corner map, in dark area, shows the portion of the continent included in the larger map.

area of West Central Africa and carries much of the commerce of the two territories known as French Equatorial Africa and the Belgian Congo. Practically all the vast quantities of rubber shipped out of the Belgian Congo have been transported down this stream. The first definite knowledge obtained of this mighty river was secured by Henry M. Stanley, the African explorer (see STANLEY, HENRY M.). It has its source in the heart of "Darkest Africa," where the elephant, gorilla, crocodile, and other strange animals are found in the wooded, shadowy wilderness.

The head stream, known as the Chambezi, flows southwest and empties its waters into Lake Bangweolo. Emerging from the lake, it becomes known as the Luapula, which in turn loses itself in Lake Moero. Flowing north from this lake is the great stream of the Lualaba. It does not become known as the Congo until it reaches latitude 4° south. From this point to the sea it is a mighty river, dotted with islands and navigable for more than 1,000 miles. Differing from all other African rivers, the Congo has no delta, and its mouth is unobstructed. Four tributaries join it in its lower reaches, the Lomami, the Aruwimi, Ubangi,

and the Kwa, all combining to form one of the most majestic of the world's waterways. About 300 miles from the mouth is Stanley Pool, in which the river widens into a lake. It leaves the Pool in a broad stream which at its mouth attains a width of over ten miles. In various sections narrows and rapids prevent navigation, but railway lines have been built around these, so there is formed a continuous commercial route for more than half the length of the river, which is estimated at 3,000 miles. The total area of its drainage basin is not less than 1,600,000 square miles.

The commercial importance of the Congo has so increased that there are now considerably more than 200 large steamers plying the upper reaches, penetrating inland as far as navigation is possible and bringing down the rich products of the country.

CONGREGATIONAL, *kong gre ga' shun al*, **CHURCH**, a religious denomination of Protestants whose name is derived from the belief of its adherents that every congregation of Christians should be an independent body. Every Congregational body exercises the right of electing or deposing its officers, of disciplining its members, and of determining its own forms of worship. There is no appeal to a higher church body or to any high church official or conference, but the advice and cooperation of neighboring churches are often sought.

The modern Congregationalist movement originated at the time of the English Reformation, its earliest advocates having been identified with the radical wing of the Puritans (which see). The most important of its leaders was Robert Browne, who urged separation from the Church of England so zealously that at first the Congregationalists in England were called *Separatists*. Congregationalism was planted in America by the Pilgrim Fathers, who settled Plymouth in 1620, and most of the early Puritan churches were founded on the Congregational model. See PILGRIMS; PURITANS.

This denomination in America has always been relatively strongest in the New England and other Eastern states, and it has been notably identified with higher education. Yale, Dartmouth, and Amherst colleges and Andover Theological Seminary are among the important institutions which owe their establishment to Congregational enterprise.

In 1929 occurred a merger of the General Council of the Congregational Churches and the General Convention of the Christian Church, a union of 1,100,000 members. The official name now is the General Council of Congregational and Christian Churches.

CONGREGATION OF THE INDEX. See INDEX EXPURGATORIUS.

CONGRESS, *kong' gres*, a word derived from the Latin, signifying a *meeting together*. In international affairs, it is applied to those

assemblies, composed of representatives of different nations, called to settle questions affecting the welfare of all of them. It is difficult to overestimate the importance of some of the great European congresses in deciding vexed questions, such as settling boundaries and establishing the balance of power. Some of them have been attended by the sovereigns themselves, and when delegates have been sent, they have invariably been the greatest statesmen of the various countries. In its widest sense, the word *congress* is applied to those assemblies which draw up treaties of peace to be submitted to their governments, but these are more commonly known as *peace conferences*.

The congresses, so called, which have been most influential in European affairs have been the following:

Congress of Vienna, which met in 1814-1815 and adjusted the affairs of Europe after the Napoleonic era.

Congress of Paris, which met in 1856 and settled the tangled questions growing out of the Crimean War. This congress marked a step in the unification of Italy, for Cavour's admission as a delegate and the favor shown him constituted a recognition on the part of the great powers of the work he was trying to do.

Congress of Berlin, which met in 1878 and concerned itself with the readjustment of the terms of the Treaty of San Stefano.

In the United States, the word Congress commonly refers to the legislative department of the Federal government. See CONGRESS OF THE UNITED STATES, the article immediately following.

Related Subjects. The reader is referred in these volumes to the following articles:

Balance of Power
Berlin, Congress of

Paris, Treaties of
Vienna, Congress of

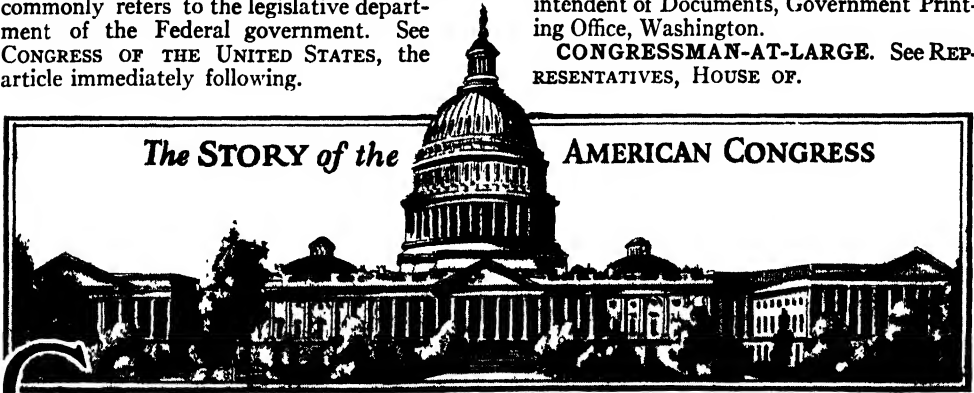
CONGRESS HALL. See PHILADELPHIA, PA.
CONGRESSIONAL MEDAL OF HONOR.
See DISTINGUISHED SERVICE MEDALS.

CONGRESSIONAL RECORD. A printed journal of the daily proceedings of the Congress of the United States has been issued since 1799. Prior to that date, only "starchamber," or secret, sessions were held by the Senate, but after that date all regular sessions were open to the public, and publication was required, except in the case of "executive sessions." From 1799 to 1824, this publication was known as the *Annals of Congress*; from 1825 to 1837 as the *Register of Debates*; from 1837 to 1874 as the *Congressional Globe*; but since the latter date as the *Congressional Record*. Permission to print undelivered speeches is granted, and they appear in the *Record* as if they had actually been given. Stenographic reports of debates are also revised by the participants before being published. Each member of Congress finds on his desk in the morning a copy of the *Record* containing the full account of proceedings in the Senate and House for the preceding day. The *Record* is sent regularly without cost to public libraries, and any individual may subscribe for it. The cost is \$1.50 for one month, \$4 for the short session, and \$8 for long sessions. Subscriptions should be addressed to the Superintendent of Documents, Government Printing Office, Washington.

CONGRESSMAN-AT-LARGE. See REPRESENTATIVES, HOUSE OF.

The STORY of the

AMERICAN CONGRESS



CONGRESS OF THE UNITED STATES. This body constitutes the legislative department of the Federal government. It is composed of members chosen by the forty-eight states, the number determined by the body itself, with the following exceptions: the territories of Alaska and Hawaii are each represented by a Delegate; the Philippines and Porto Rico send resident Commissioners to Congress. Delegates and Commissioners have the right to speak on questions pertaining to their jurisdictions only, but they have no vote. The

legal title of the body is *The Congress*, although custom has shortened it to *Congress*; the name is a natural development from that applied to meetings of European sovereigns or their envoys to arrange international affairs. See CONGRESS.

Organization of Congress. The Constitution prescribes that there shall be two houses of Congress, a Senate and a House of Representatives. The former is composed of two members from each state, chosen at large for six years, and representing, in a broad way, the sover-

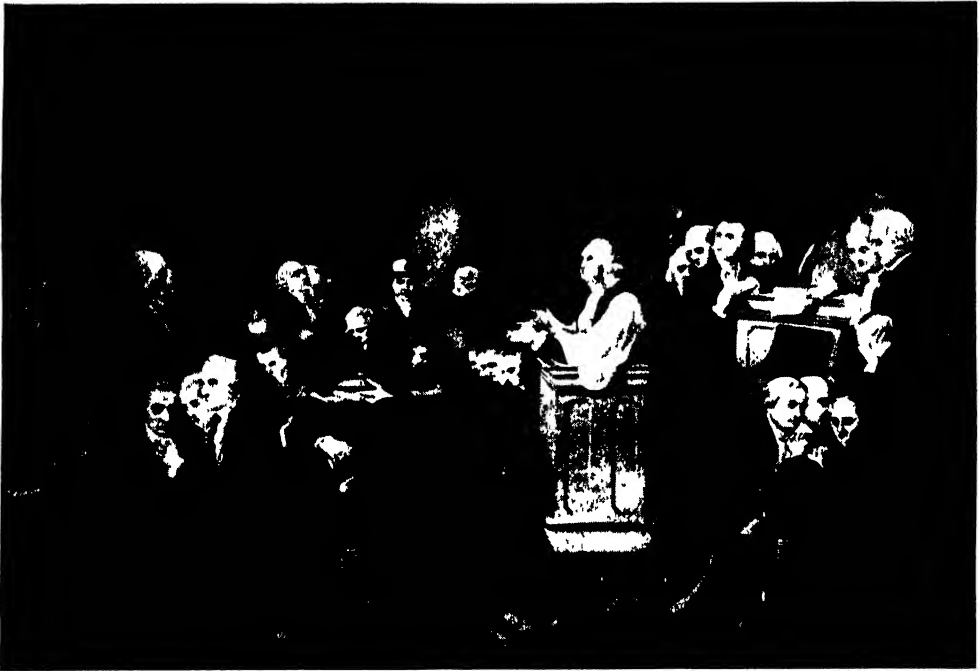


Photo Visual Education Service

FIRST PRAYER IN CONGRESS

This scene does not represent a session of the Congress of the United States, but of the First Continental Congress, in Carpenter's Hall, Philadelphia, September 7, 1774.

eighty of the state and all the people of the state; the latter is composed of members whose election is by Congressional districts, each member responsible to the people of his district. Both Senators and Representatives are elected by direct vote of the people. The House of Representatives is called the "popular" branch (derived from *populus*, meaning *people*), because it has from the first been chosen directly from the citizenship every two years, while the election of Senators until 1912 was entrusted to the various state legislatures.

Each House may choose its own officers, except that the Vice-President of the United States, by Constitutional provision, must be President of the Senate. The presiding officer of the House of Representatives is called the Speaker, a name borrowed from the House of Commons of the English Parliament; he is always chosen from the membership of the House, although any private citizen may be selected for the position. The committee memberships in each house are assigned by a special committee appointed for the purpose; with respect to the House of Representatives, this is a change from custom dating from the foundation of the government, for until the Sixty-second Congress (1911), the Speaker arbitrarily appointed all House committees.

Powers of Congress. Unlike the English Parliament, Congress is restricted in its powers

of legislation; the former is the only law-making body now in Great Britain, while in the United States each state is supreme in local affairs, and "the powers not delegated to the United States by the Constitution, neither prohibited by it to the states, are reserved to the states respectively, or to the people."

The Constitution specifically defines the legislative power that shall be reserved to Congress; from the following lists of powers thus delegated, it will be clear that those broad measures whose effect is more far-reaching than the boundaries of any single state are subject exclusively to national control. Congress shall—

1. Lay and collect all taxes and duties for the support of the Federal government.
2. Borrow money on the credit of the United States, and pay all national debts
3. Regulate commerce with foreign nations and among the states.
4. Pass laws regarding naturalization and bankruptcy, all of which shall be uniform in their operation throughout the Union.
5. Coin money, regulate the value of it, and declare what shall be the standards of weights and measures.
6. Fix penalties for counterfeiting the coin and securities of the United States.
7. Establish and control postoffices and post roads.
8. Provide the protection of copyrights and patents to authors and inventors.
9. Establish Federal courts in the United States judicial system below the Supreme Court.

10. Define and punish piracy and felonies committed on the high seas.

11. Declare war and grant letters of marque and reprisal in time of war; also raise and support armies and provide and maintain a navy, but no Congress can appropriate money for such purposes beyond the two-year limit of its existence.

12. Provide for calling forth the militia to execute the laws, suppress insurrections, and repel invasions; also provide for organizing and arming of the militia when called into government service.

13. Exercise exclusive legislation in the Federal district in which the Capitol is located

14. Have general power to pass laws which shall be necessary and proper to make effective its legislation on all the matters enumerated above.

Legislation by Committee. Every measure proposed for passage in either house of Congress is referred to a committee for consideration before a vote is taken on it. This is especially necessary in the House of Representatives, since it is so large that it is impossible for the entire membership to give consideration to even a limited number of the thousands of bills annually offered for passage. The committees of Congress are therefore powerful bodies, for they are the key to all legislation. If a committee reports a bill favorably, its acceptance by the House is likely, but of course not certain; if an unfavorable report is made, it nearly always defeats the measure. A bill may be killed if the committee to which it is referred does not think it proper to present a report on it, and thousands of bills "die in committee" every year.

There are about fifty committees in each house, and appointments to these are for two years, the life of one Congress. Membership on committees is eagerly sought, especially on those that are most important and powerful. The leading committee of the House of Representatives is the Ways and Means Committee, charged with providing ways and means of raising money to meet the expenses of the government. It prepares all tariff bills, for the Constitution provides that "all bills for raising revenue must originate in the House of Representatives." The similar committee in the Senate is called the Finance Committee, and it is privileged to alter or amend a tariff bill to meet its views. Other leading committees of each house are those on Appropriations, Foreign Affairs, Judiciary, Rules, Military Affairs, Naval Affairs, Elections, Immigration, Rivers and Harbors, Interstate and Foreign Commerce, and Insular Affairs.

How a Bill Becomes a Law. For a discussion of the manner in which a bill is passed through Congress or a state legislature, see the article *Law*, in regular alphabetical order.

Long and Short Sessions. The life of each Congress is two years, which is the length of the term of a Representative. On the fourth day of March of odd-numbered years, each Congress expires by limitation, and on that day

begins the life of a new Congress. Unless extraordinary events demand a spring or summer session, the *first session* of a new Congress does not occur until the first Monday in December. It sits, usually, six or seven months, seldom later than July, and in that time endeavors to pass all legislation of an important nature except appropriation bills. This is called the *long session*, and its length cannot exceed one year; in a crisis it may be kept in continuous session the entire summer, and even up to the date of the next regular annual meeting in December. The *second session* of the same Congress begins on the first Monday in December, exactly one year after the first session convened; its existence must terminate on the fourth day of March, at noon. All imperative legislation not taken care of during the *long session* must be rushed through the brief months of the second, or *short session*. During these three months, appropriation bills are passed, as well as such emergency bills as demand attention.

Special Session. Extraordinary events may require the attention of Congress at a time when its regular meeting is some months distant. The President is empowered to call Congress in *extraordinary*, or *special*, session whenever in his judgment such a step is necessary. In the published call, he states his reasons for convening the legislative branch; and while Congress will give due attention to matters pointed out by the President, its liberty in the direction of other legislation during the special session is unlimited. The length of the special session is determined by the urgency of public business; it may extend up to the day in December when the next regular session begins, in which event it would merge into the latter.

Salaries. Except for the one year of 1795, there has been equal compensation to Senators and Representatives. In that year, Senators received \$7 per day, while Representatives received but \$6 per day. The several changes in salaries of members of both houses is given in the following table, subject to the exception above noted:

From 1789 to 1815	\$ 6.00 per day.
" 1815 to 1817	\$ 1,500 per year.
" 1817 to 1855	\$ 8.00 per day.
" 1855 to 1865	\$ 3,000 per year.
" 1865 to 1871	\$ 5,000 per year.
" 1871 to 1874	\$ 7,500 per year.
" 1874 to 1907	\$ 5,000 per year.
" 1907 to 1925	\$ 7,500 per year.
" 1925 to —	\$10,000 per year.

E. D. F.

Related Subjects. The above article does not enter into detail respecting the organization of either house of Congress, nor explain certain topics referred to. In the following articles in these volumes, such subjects are treated at length:

Bill	Law
Committee of the Whole	Senate
Congressional Record	Speaker
Delegate	Territory
Representatives, House of	

CONIFERAE, *ko nif' ur e*. See **CONE-BEARING TREES**.

CONJUGATION, *con ju ga' shun*. The conjugation of a verb begins with naming its principal parts, and then follows the verb in systematic order through the different modes, tenses, persons, and numbers, in both the active and the passive voice, finishing with a statement of its three participles. The result is a complete and orderly review of the verb, not only in its simple forms, but in the compound forms or verb-phrases. The latter are derived by combining one of the principal parts of the verb with one or more of such auxiliary verbs as *am, were, have, been, will, or may*.

To shorten so lengthy a process, conjugation is usually carried through the various tenses,

To Stimulate Interest. An excellent means for increasing the interest and practical value of the conjugating exercises is to require the use of additional words after the verb form—an object, an adverb, or an adverbial phrase—so as to make a complete sentence; as, *I hide the book, I hid from the boy, I am hidden from the others*, and so on. Such a plan is especially valuable with verbs like *sit, set, lie, lay, rise, raise*, and others in which a careful distinction must be made between the transitive and intransitive forms. The pupil feels he is building actual sentences, and not merely rehearsing a lifeless set of rules which may or may not be of real use to him. There is no value in memorizing mechanically any verb in all of its inflections; it is important, however, that a student

Conjugation of the Verb "Hide"

PRINCIPAL PARTS		
Present	Past	Past Participle
hide	hid	hidden
TENSES		
ACTIVE VOICE—INDICATIVE MODE		
<i>Present</i>	<i>I hide, you hide, he hides, we, you, they hide</i>	
<i>Pres Perfect</i>	<i>I have, you have, he has; we, you, they have hidden</i>	
<i>Past</i>	<i>I, you, he, we, you, they hid</i>	
<i>Past Perfect</i>	<i>I, you, he; we, you, they had hidden</i>	
<i>Future</i>		
(expectation)	<i>I shall, you, he will; we shall, you, they will hide</i>	
(determination)	<i>I will, you, he shall; we will, you, they shall hide</i>	
<i>Future Perfect</i>		
(expectation)	<i>I shall, you, he will; we shall, you, they will have hidden</i>	
(determination)	<i>I will, you, he shall; we will, you, they shall have hidden</i>	

modes, and voices with a single person and number—the pronoun "I," for example. Such an abbreviated conjugation is called the *synopsis* of a verb.

Conjugation is the *inflection of a verb*, just as declension is the inflection of a noun and comparison the inflection of an adjective or an adverb.

A Simplified Scheme. A very compact arrangement of the different forms for use in preparing written conjugations is indicated in the above scheme. A point to notice in the accompanying plan is the careful differentiation of *will* and *shall* in the different persons, to indicate simple futurity or expectation, on the one hand, and promise or determination, on the other.

The conjugation continues in like manner through the subjunctive, imperative, and infinitive modes—the modern tendency being to reject the old potential mode; it lists the present, past, and past perfect participles, and then repeats the entire process in the passive voice. For all these forms a good textbook on English grammar should be consulted.

A full conjugation would cover also the *interrogative, negative, and emphatic* forms (the latter conjugated with the auxiliary *do*), and would include *progressive* conjugation—a term used for forms expressing continuous action, as *I am singing, I have been singing, I was singing, I shall be singing*, and similar combinations of the verb *be* with the present participle.

should know the actual machinery necessary to express various shades of meaning, and this he can best learn by actual practice in the forming of various verb phrases. See **GRAMMAR; INFLECTION**. E.U.G.

CONJUNCTION, *kon junk' shun*, a term used in astronomy to denote certain relative positions of heavenly bodies. In connection with the planets, conjunction refers to their positions as related to the earth and sun. A planet, as Mercury or Venus, whose orbit lies inside that of the earth's, is said to be in *inferior conjunction* (with the sun) when it is in the same straight line with the earth and sun, in the order of earth, planet, sun. It is in *superior conjunction* when the sun is between it and the earth. A planet outside the earth's orbit is in conjunction when in a straight line with the earth and sun in the order of earth, sun, planet. A planet is in *opposition* to the sun when the earth is in a line between it and the sun. When the sun and moon are in conjunction, so that the moon intervenes between the sun and an observer on earth, we have a solar eclipse (which see). The moon and a star in the same relative position give rise to an *occultation*. F.B.L.

CONJUNCTION. One of the classifications into which the words of the English Language have been divided consists of words which do

not modify, but serve the sole purpose of connecting. To this group the name of *conjunction* was given, derived from two Latin words meaning *joined with*. A complete grammatical definition would be: A conjunction is a word used to connect phrases, clauses, sentences, or other words. There are two kinds, called *coördinate* conjunctions and *subordinate* conjunctions.

Coördinate Conjunctions. A coördinate conjunction is one which connects two sentences, two words, two phrases, or two clauses which are grammatically equal. The first use may be illustrated by a sentence like this: "He reads well, *but* his sister reads better." *But* is a coördinate conjunction which connects the two simple sentences, "He reads well" and "His sister reads better," each of which is complete in itself. In the sentence, "He *and* his sister read well," *and* is a coördinate conjunction connecting two words which are of the same rank—the pronoun *he* and the noun *sister*, which together form the subject of the sentence.

A coördinate conjunction may connect two phrases: "In red coats *and* in blue coats, the soldiers came marching." It may also connect two clauses which have the same grammatical value; as "He said that a storm had delayed him *or* he would have been there earlier." Both clauses, "that a storm had delayed him," and "he would have been there earlier," are a part of the complete predicate, the object complements of the verb *said*.

The principal coördinate conjunctions are:

Expressing addition: and, also, both, as well as, moreover, further, likewise.

Expressing separation or choice: either, or, neither, nor, else, whether, otherwise

Expressing opposition: but, yet, still, however, while, only, nevertheless, whereas.

Expressing effect or result: therefore, hence, consequently, so, so that, thus, then

Conjunctions in Pairs. Many of the coördinate conjunctions frequently occur in pairs, as in the following constructions:

Both *and:* *Both* my sister *and* my brother attend school.

Not only *but also:* He *not only* reads *but also* writes uncommonly well.

Either *or:* *Either* I must go now *or* I cannot go at all.

Neither *nor:* *Neither* the child *nor* the man realizes the danger.

Whether *or:* *Whether* it rains *or* shines, I intend to leave to-morrow.

Though *yet:* *Though* he was nearly exhausted, *yet* he refused to rest.

These are known as correlative conjunctions.

Subordinate Conjunctions. A subordinate conjunction is one which joins a subordinate clause to the principal clause of a sentence—elements which are not grammatically equal.

In such a sentence as, "He can read better *than* I can," *than* is a subordinate conjunction, connecting the subordinate clause *than I can* (*read* is understood) with the principal clause *he can read better*.

The commonest of the subordinate conjunctions are:

Expressing time or place: when, as, since, while, before, ere, after, until, where.

Expressing cause or reason: because, since, as, now, whereas, inasmuch as, for.

Expressing condition or supposition: if, unless, though, provided, in case, even if

Expressing purpose or result: that, so that, lest, in order that, so . . . as.

Expressing comparison: than (after comparative), as . . . as, so . . . as.

The distinction between coördinate and subordinate conjunctions is very important, because it furnishes a means of classifying sentences in analysis. If the conjunction connecting two clauses is coördinate, the two clauses form a *compound sentence*; but if the conjunction is subordinate, the two clauses are unequal and form a *complex sentence*. Punctuation and word inflections all depend upon this classification and make it important.

Common Errors. The errors most frequently made in the use of the conjunction arise from carelessness in using the correlatives and the comparative *than*, from combining a plural verb with two subject nouns connected by *or* or *nor*, or from fitting a singular verb to two nouns connected by *and*. These and a few other familiar mistakes are covered in the following examples:

John is as old but not taller than Richard, for John is as old as, but not taller than, Richard, or John is as old as Richard, but not taller. The correlative conjunction is *as . . . as*, and it is just as important to use the second *as* in making the comparison as the first. If the facts warranted, one might say, "John is *older* but not taller than Richard," for *than* may introduce a clause referring to two adjectives, provided both are in the comparative degree.

Mine is as good and better than yours, for Mine is as good as yours, if not better, or if not even better. The same comment applies as in the foregoing.

I will not go without you come too, or except you come too, for I will not go unless you come too. *Without* and *except* are prepositions, not conjunctions, and constitute improprieties of speech when used to connect clauses.

He looks like he had been traveling, for He looks as though he had been traveling. *Like*, too, is a preposition, incorrectly used as a conjunction. This is an exceedingly common error.

Why don't you do like I do? for Why don't you do as I do? Like for as is as incorrect as like for as though.

Neither the son nor the father were there on time, for Neither the son nor the father was there on time. The correlative *neither . . . nor*, like *either . . . or*, requires a singular verb when connecting singular nouns. In such a sentence as *Neither the members nor their friends were charged admission*, the plural verb *is*, of course, correct.

His enthusiasm and energy makes him a most useful member of the committee, for His enthusiasm and energy make him a most useful member of the committee. Two or more singular nouns connected by *and* take a plural verb.

He is not as prosperous as he looks, for He is not so prosperous as he looks. *As . . . as* is used when equality is expressed, and *so . . . as* to express inequality or with a negative statement.

He neither questioned me nor my companion, for He questioned neither me nor my companion. *Neither . . . nor* connects *me* and *companion* and has no reference to the verb *questioned*. The correlative conjunction should be placed close to the words with which it belongs. It would be correct, however, to say *He neither questioned nor detained me and my companion*.

Please try and finish this lesson by noon, for Please try to finish this lesson by noon. *And* must connect equal elements; here the idea is not *please try and please finish*, but *please try to finish*. This use of *and* instead of *to* before an infinitive is a very frequent mistake.

I do not know if I can be there by Tuesday, for I do not know whether I can be there by Tuesday. *If* introduces a condition, *whether* an alternative.

He thought as how he might be able to manage it, for He thought that he might be able to manage it. *How* or *as how* in place of the conjunction *that* is an impropriety.

I don't doubt but what you can do it, or I don't doubt but that you can do it, for I don't doubt that you can do it. *But what* is doubly wrong, because *what* is not a conjunction at all, but a relative pronoun. *But that* is equivalent to a negative, so that the sentence as originally given would mean, *I do not doubt anything except that you can do it*, which is clearly not the intended meaning.

CONJUNCTIVA, *kon junk ti' vah*. See EYE; LACHRYMAL GLANDS.

CONJUNCTIVITIS, *kon junk ti vi' tis*. See BLINDNESS (Common Eye Diseases).

CONJURING, *kon' jur ing*, a term which in its older reference applies to the notions of magic and the command of occult forces. The conjurer was in that sense a sorcerer, or worker of wonders, presumably by alliance with superhuman powers. The modern term applies to arrangement of deceptive appearances that seem to contradict the laws of nature, but are due to sleight-of-hand and mechanical devices. In addition to the clever application of physical principles, two other factors enter into conjuring; the one is the quick and dexterous movements—sleight-of-hand, or *legerdemain*—by which what is actually done is concealed; the other is the psychological factor of inducing the spectator to make false inferences by misdirecting his attention and guiding his inferences toward a coöperation in the effect.

The ancient conjurers employed physical devices to impress the people with their powers. It is known that by the use of concave mirrors an image was reflected upon the smoke of burning incense and an impressive apparition produced; and that the effect of a voice speaking mysteriously, like an oracle, was

produced by means of tubes and echoes. The tradition of conjuring in India indicates a considerable knowledge of tricks of deception; and amusements of this nature are recorded in the Middle Ages.

The Modern Art. This dates from the middle of the nineteenth century and the contributions of Robert Houdin. At that time there was much interest in automaton, or figures that moved, played cards or chess, answered questions, and the like; in most cases, a person was skilfully concealed within and produced the effects. Houdin constructed far more mysterious automaton, in which, through levers, strings, and tubes inserted in the legs of the stand that held the figure, an assistant stationed below could manipulate the mechanism. He improved also upon such effects as the illusion of a detached human head, or head and body seemingly floating without legs; or again, the mysterious appearance or disappearance (vanishing) of a person in a cabinet. The principle was that of a set of mirrors which gave the effect of clear space under the body, while actually the mirrors concealed the legs; mirrors similarly provided a space for the "vanishing lady." The mystery of a person resting on one elbow supported by a rod, with the body horizontal, was due to a rigid steel frame worn under the clothing; the effect was made more mysterious by the pretense of "mesmerizing" the subject to produce the illusion.

Houdin employed magnets, then quite a novel device; made a chest heavy or light (by secretly turning on an electro-magnet under the stage); he used an electric current to heat a platinum wire, which burned a thread, which released a false lid, and mysteriously made coins appear in a transparent glass box. He refined the devices and made the effects more baffling. In such a trick as pouring all kinds of liquors from the same bottle, he not only used the older principle of controlling the fluid by placing his thumb over an air-hole, but also had different essences in the bottom of the several glasses on the tray, so that by choosing the glass, he could produce the desired flavor. By *palm*ing, that is, skilfully concealing objects in the hand; by directing the attention to the one hand while the other performed the trick; by clever talk and a mysterious setting, he enhanced the art of the illusionist.

The principles underlying the conjuring tricks of the stage may be readily illustrated. Some of the devices involve rather complex applications of physical and chemical principles; a recent one controls a wooden hand that answers questions, by a wireless telegraphy outfit. But even simple devices, such as a fine silk thread which pulls out of a pack a desired card (which first has been "forced"—that is, pushed forward so that it will be

chosen when apparently a free choice of cards is offered)—are often quite as baffling. False bottoms, pockets, hollow wands, substitution of a second object like the first, traps in tables, double openings, facilitate the disappearance and reappearance and transformation of objects.

A single trick described in detail will best illustrate the most important factors involved. Several gold rings are gathered from the audience on the conjurer's wand; they are then thrown on a platter and hammered until they fit in a pistol; the pistol is fired at a set of boxes hung from a cord; the first box is opened with a key and a second taken from inside it, then a third, and a fourth, and a fifth; in the last box are found the original gold rings quite whole and each tied to a bonbon. What the spectators fail to observe is (1) that the wand is changed from the right to the left hand of the performer as he steps back on the stage, thereby allowing the real rings to slip into the right hand of the performer, while false brass rings which were in the left hand are pushed forward on the wand; (2) that the performer calls for a pistol, which is brought by an assistant, to whom he at the same time gives the gold rings; (3) that as the pistol is fired the assistant pushes a small table (with a fringe) on the stage; (4) that the performer gets this table and places the boxes upon it; (5) that the second box is really taken from the first and the third from the second, but that the last box is pulled from under the table (concealed by the fringe) and the box displayed as though it had come from the next larger one. The assistant had tied the true rings to the bonbons and placed them in the box while the hammering of the false rings was going on. The ingenuity of a trick is thus seen to depend upon the combined mechanical and psychological effects.

There is a group of tricks which aims to give the impression of the possession of unusual powers. The "second-sight," or "mind-reading," performance answers questions, gives numbers, names articles, etc., held up by the audience. It may be done by means of a code, in which a slight variation of the form of the question is the clue to the answer, performer and assistant having memorized the code. In another form, the questions are written (and a concealed impression taken, or blank papers substituted for the originals) and secretly conveyed to an assistant under the stage, who in turn speaks to the blindfolded "mind reader" through a tube; this form has been used as an evidence of "spiritualistic" power of the "medium" to read sealed messages.

The cabinet mystery was also used as an evidence of spirit-force in releasing the medium, or ringing bells, playing on tambourines, or producing spirit forms. That all this is within

the power of clever trickery has been shown again and again. Much myth and exaggeration is current in regard to the Oriental tricks, many of which, as described, never happened. The basket trick, in which a slender lad enters a basket through which a sword is pushed to and fro, and then reappears unhurt in the audience, depends upon the flexibility of the basket, the adroitness of the lad in directing the thrust, and the provision of a "double" in like dress. The bush that grows flowers in a few moments is a case of substitution.

Its Psychology. The psychology of conjuring is interesting. It shows how readily the mind is deceived and what slight prepossession will convert a trick into a miracle, how readily the mechanism remains undetected, and how completely natural means account for the appearance. The conjurer is thus the scientific successor of the sorcerer. What has changed is the attitude toward his wonders; they now afford amusement and stimulate wonder and curiosity, while in former days they aroused fear and were accepted as proofs of superhuman power.

It is related that Houdin was sent to the Arabs to overcome their superstitious beliefs in the power of their magicians. He performed with appreciation his trick of making a chest heavy or light (by turning on or off an electromagnet); the chest easily lifted by an Arab one moment was immovable the next. But when, on another occasion, he announced the same trick as the power to take a man's strength away, the Arabs fled in fear of such uncanny powers. The same performance which convinces a believer of the reality of spirit influence becomes merely a clever trick to another with a more scientific attitude. Yet it remains difficult to impress persons with the fact that what they cannot explain must not be accepted as proof of theories which they are inclined to hold, although there is no established connection between their theories and the facts not accounted for. J.J.

Relating to Various Beliefs. The articles on the following topics, while some of them do not bear on conjuring, are of interest in this connection because they, too, deal with pseudo-sciences or superstitions.

Alchemy	Occult
Astrology	Palmistry
Clairvoyance	Phrenology
Demonology	Physiognomy
Divination	Psychical Research
Faith Cure	Psychoanalysis
Horoscope	Spiritualism
Hypnotism	Subconscious
Magic	Suggestion
Medium	Superstition
Mesmerism	Telepathy
Mind Reading	Trance
Necromancy	Witchcraft

CONKLIN, EDWIN GRANT (1863-), an American zoologist, was born in Waldo, Ohio. He completed his education at Ohio Wesleyan University and at Johns Hopkins University

at Baltimore. Upon graduation from the latter school, he returned to the Ohio Wesleyan as professor of biology for several years, then accepted professorships at Northwestern University, Evanston, Ill. (1894-1896), the University of Pennsylvania (1896-1908), and Princeton University, in 1908. As an editor of scientific publications, he became widely known. He edited the *Journal of Morphology*, *The Biological Bulletin*, and the *Journal of Experimental Zoölogy*. In 1899 he was president of the American Society of Zoölogists, and was chosen president of the American Society of Naturalists in 1912.

CONKLING, *kongk' ling*, ROSCOE (1829-1888), an American statesman and lawyer, prominent in the organization of the Republican party and actively connected with its history throughout a long career. He was a typical leader in the old school of American politics. Conkling was first elected to Congress in 1858, while he was mayor of Utica, N. Y.; he had become widely known through his campaign speeches for Taylor and Scott. Except for the term between 1863 and 1865, when he held a position in the War Department, he was a member of the House of Representatives until 1867, and in that year became one of New York's United States Senators.



Photo U & U

ROSCOE CONKLING

Photographed from a bust in New York City.

Conkling was one of the best-known members of the Senate in the administrations of Johnson, Grant, and Hayes, and he was an especially active member of the "Stalwart" faction that so strenuously fought for a third term for Grant. He was out of sympathy with the reform element in his party, a bitter opponent of civil service, and firm in his belief that the Senators should be consulted in the matter of appointments made by the President.

In 1881 President Garfield nominated an anti-Conkling man for the office of collector of New York, and in spite of Conkling's opposition the appointment was confirmed by the Senate. He and his colleague, Thomas C. Platt, at once resigned, and asked for a reelection from the New York legislature. Their defeat marked the end of Conkling's political career.

CONN, HERBERT WILLIAM (1863-), an American scientist, especially gifted in bacteriology, was born in Fitchburg, Mass., studied at Boston University, and took his doctor's degree at Johns Hopkins University, Baltimore.

His only teaching experience was had at Wesleyan University, Middletown, Conn., then he was appointed as director of the Marine Biological Laboratory at Cold Spring Harbor, N. Y. Dr. Conn became a recognized authority on the bacteriology of dairy products, and advanced that phase of science with many published papers. He became the head of the Connecticut state board of health in 1905.

CONNAUGHT, *kon' nawt*, ARTHUR WILLIAM PATRICK ALBERT, Duke of (1850-), a British soldier and administrator, Governor-General of Canada from 1911 to 1916. He was the third son of Queen Victoria, and was born at Buckingham Palace on May 1, 1850. He entered the Royal Military Academy, Woolwich, at the age of sixteen, at eighteen was assigned to the Royal Engineers, then served for a few months with the Royal Artillery, and in August, 1869, was transferred to the Rifle Brigade. He was promoted to the rank of captain in 1871, and step by step won promotion to the rank of general in 1893. In Egypt, in 1882, he commanded the Guards Brigade at the Battle of Tel-el-Kebir. He was mentioned several times in dispatches, was made Companion of the Bath, and was thanked by Parliament.

From 1886 to 1890, the duke was in active command of the Bombay army in India, and then for eight years was in England as commander of the southern district and later of the Aldershot district. He succeeded Lord Roberts in 1900 as commander in chief of the forces in Ireland. Four years later, when the war office was reorganized, the duke was appointed to the newly created office of inspector-general of the forces, which he held until 1909, when he became commander in chief in the Mediterranean, with headquarters at Malta. On October 13, 1911, he became Governor-General of Canada, and for five years fulfilled the duties of that exacting office with great skill and was one of the most popular Governors-General Canada has known. His last public duty in Canada was to lay the corner stone of the new Parliament Buildings at Ottawa; the corner-stone of the old structure (destroyed by fire in 1916) was laid by his brother Edward, later King Edward VII, about fifty years earlier.

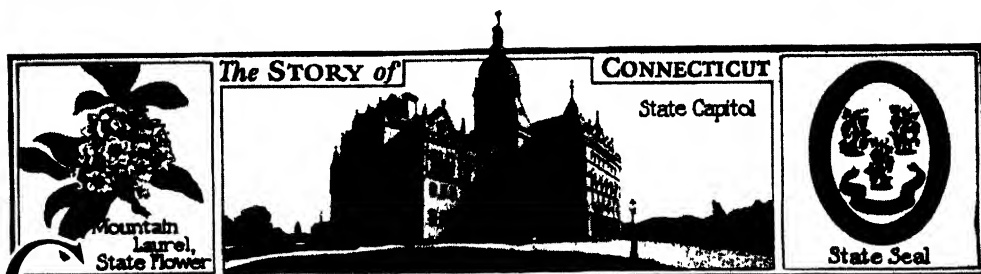
CONNEAUT, *kon' e ot'*, OHIO. See OHIO (back of map).



Photo. Brown Bros.

DUKE OF CONNAUGHT

Governor-General of Canada from 1911 to 1916. He is an uncle of King George V of England.



CONNECTICUT, *kon nel' i kut*. One of the original thirteen states of the American Union, Connecticut is a mixture of old and new. The airplane soars above fields in which an occasional yoke of oxen may be seen; on concrete highways, rumbling trucks move under overarching elms through peaceful villages whose houses were passed by the British redcoats. And it is a short distance from natural forests and rocky hillsides pink with mountain laurel to the smoky factories, symbol of Connecticut's industrial development. Originally, Connecticut was an agricultural state, and its men tilled their farms, raised tobacco, and set sail in pursuit of the whale or of West Indian rum and molasses. The whaling days are over, but tobacco still holds an important place, and the early manufactures of clocks, brass, and thread have remained and grown with the country. **THE LAND OF STEADY HABITS** is an appropriate name for this New England state.

Size and Location. This irregularly rectangular state lies on Long Island Sound, with New York on the west; it is bounded on the north by Massachusetts and on the east by Rhode Island. It is over one-third larger than Delaware and Rhode Island together, covering about 4,965 square miles, and is the third smallest state in the Union.

The People. The population of Connecticut is close to 1,500,000, or 300 to the square mile. Only Rhode Island, Massachusetts, and New Jersey, in the order named, have greater density of population. About sixty-eight per cent of the population live in towns of 10,000 or over. The native population, born of native parents, is less than one-third of the total; the remainder is foreign-born or of foreign parentage. The Italians form the largest part of this foreign population, with the Poles and Irish next in numerical order. There are many Russians, who form, next to the Germans, the largest class of foreign farmers. There are about 21,000 negroes.

Connecticut, which was a refuge for the English Nonconformists and long a stronghold for the Congregational Church, is now largely Roman Catholic, because of the large foreign population. The other Churches, in order,

are the Congregational, Protestant Episcopal, Methodist, and Baptist.

Education. Provisions for education at public expense have been zealously advanced since the earliest colonial days. Illiteracy among those of native birth is almost unknown, but the influx of alien adults has raised the percentage of illiteracy to 6.2 per cent.

The school fund of the state was largely established by the sale of the Western Reserve, a large tract of land granted to Connecticut in 1786. This Western Reserve lay within the present state of Ohio. The school system, however, was established in 1644. All children between the ages of seven and sixteen must attend school, unless excused after they are fourteen because they must work. Besides over 1,200 elementary schools, there are over ninety high schools, four state normal schools, which are located at New Britain, Willimantic, New Haven, and Danbury, and are under control of the state board of education, and a city normal school at Bridgeport. The legislature has further authorized instruction in trades and useful occupations wherever the state board of education may determine. State expenditures for education have increased to over \$30,000,000 yearly. Connecticut is steadily reducing the number of its one-teacher schools.

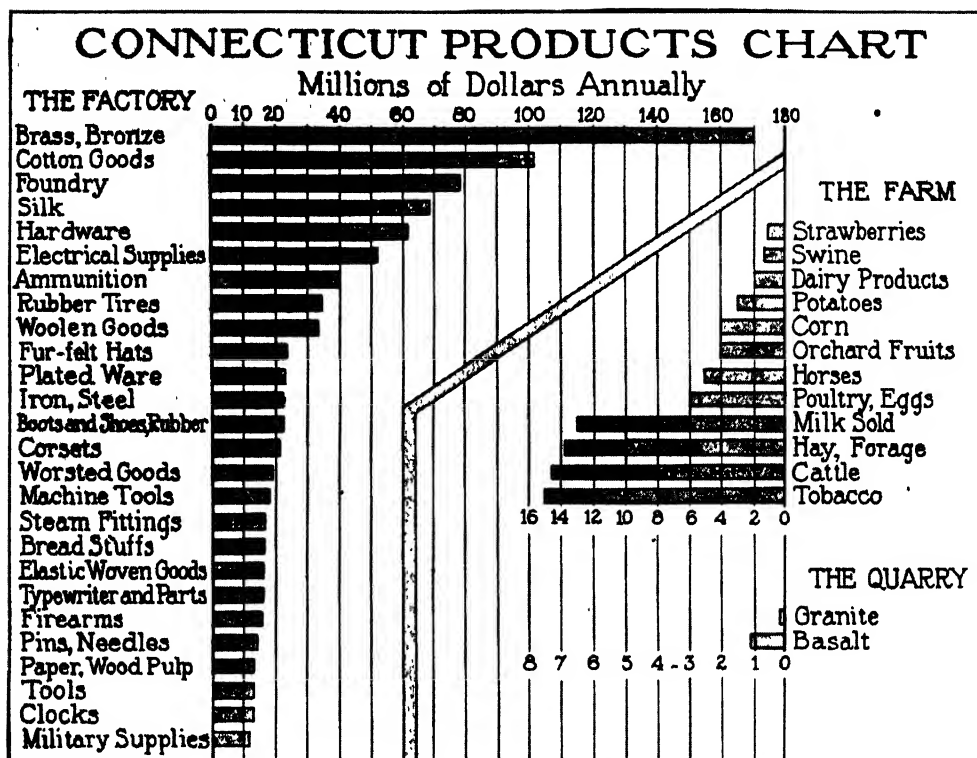
There is no state university, but there are a number of endowed colleges for higher education. Yale University at New Haven, established in 1701, is one of the oldest and best known in the country; it is described at length under its title in this work. There are also the following educational institutions:

Connecticut College for Women was founded at New London in 1911, and has a staff of over fifty instructors. The campus occupies 340 acres north of the city.

Trinity College, at Hartford, was founded by members of the Protestant Episcopal Church in 1823. It was named Washington College originally. Courses in civil engineering are offered, in addition to literary and scientific work.

Wesleyan University was founded at Middletown in 1831. From 1872 until 1912 it was coeducational. All degrees are conferred.

Connecticut Agricultural College was established at Storrs in 1881, as the Storrs Agricultural School. Be-



THE FIGURES REPRESENT AN AVERAGE FOR THREE YEARS

sides courses for resident students, there is a department for research and an extension service for teaching farmers. It is a state college, authorized to enter the liberal arts field.

Hartford Seminary Foundation, which now includes the Hartford Theological Seminary, the Hartford School of Religious Education, and the Kennedy School of Missions, was established in 1833. The Foundation is under the patronage of the Congregational Church, and is in effect "an Interdenominational University of Religion."

State Institutions. The State maintains hospitals for the insane at Middletown and Norwich, reformatories at Cheshire and Meriden, and Long Lane Farm, which is an industrial school for girls, at Middletown. The state also has a school for the feeble-minded at Mansfield, an institution for the deaf, and numerous hospitals and tuberculosis sanitariums throughout the state. The state prison is at Wethersfield.

The Land and Its Rivers. Connecticut is hilly, and in many parts is very picturesque. In the west and in the east, the land is high, with a fertile lowland in the center of the state. In the northwest corner are a number of low mountains, Bear Mountain in Salisbury, with an altitude of 2,355 feet, being the highest. There are three important river valleys. The central one, the Connecticut Valley, is the most

fertile; it contains about 600 square miles of good, low, flat land, above which rise the Hanging Hills, near Meriden. In the eastern part of the state is the valley of the Thames. The Housatonic-Naugatuck system of rivers is in the western portion of the state. The Connecticut River flows south through the state into Long Island Sound.

Throughout the state are numerous small lakes and many little rivers, the latter of which, with their falls and rapids, furnish power to great industries. The coast of Connecticut is irregular, with here a rocky point, there a sandy beach, and occasionally a good harbor.

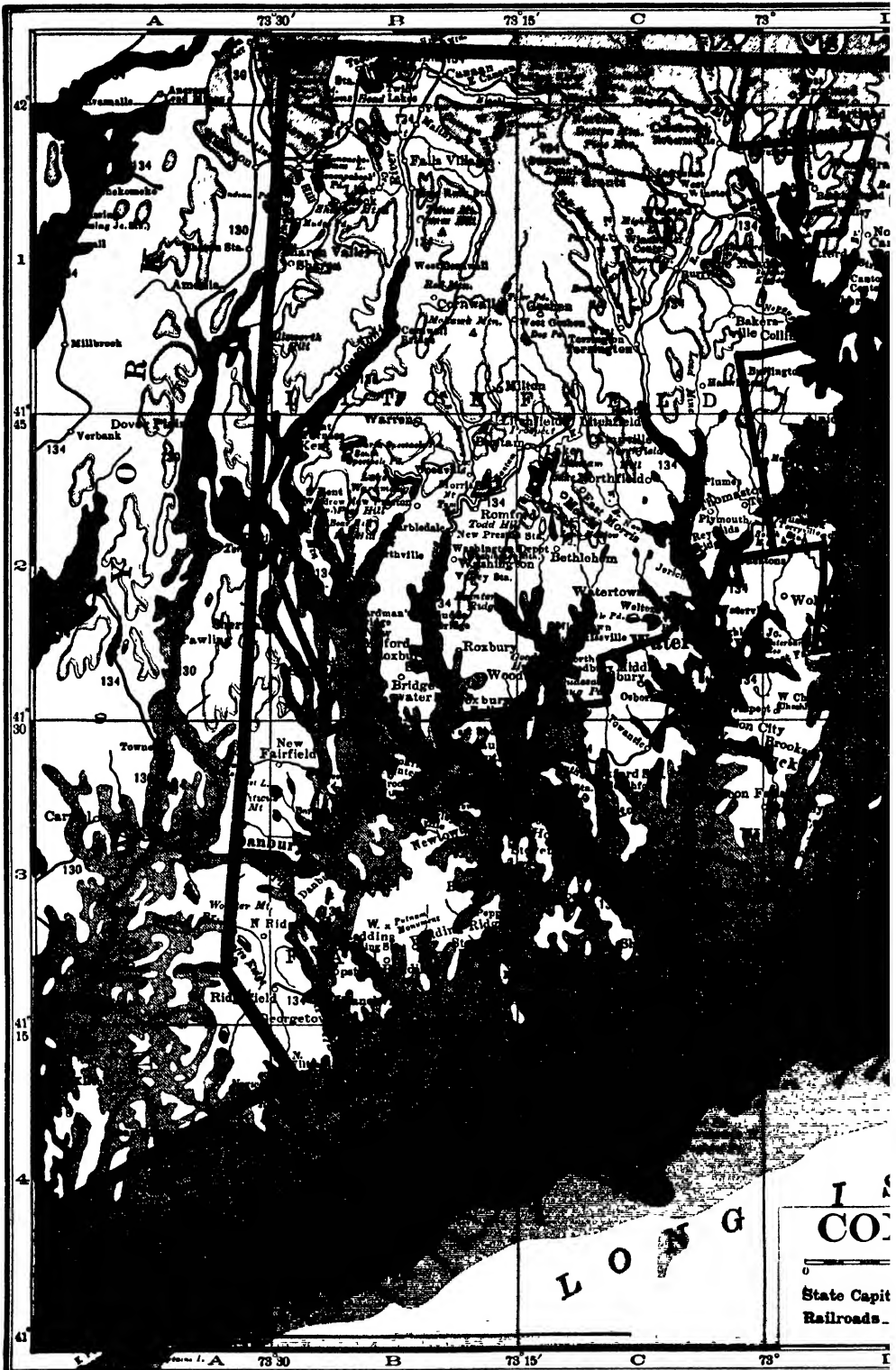
Climate. Owing to winds from the west and southwest, the climate is subject to sudden changes, but these winds temper the severe winters and hot summers. The pleasantest season is autumn, although the northwestern hills and the rocky seacoast are frequented all the summer by visitors from New York and near-by cities. The rainfall is sufficient everywhere for agricultural purposes, therefore irrigation is practically unknown.

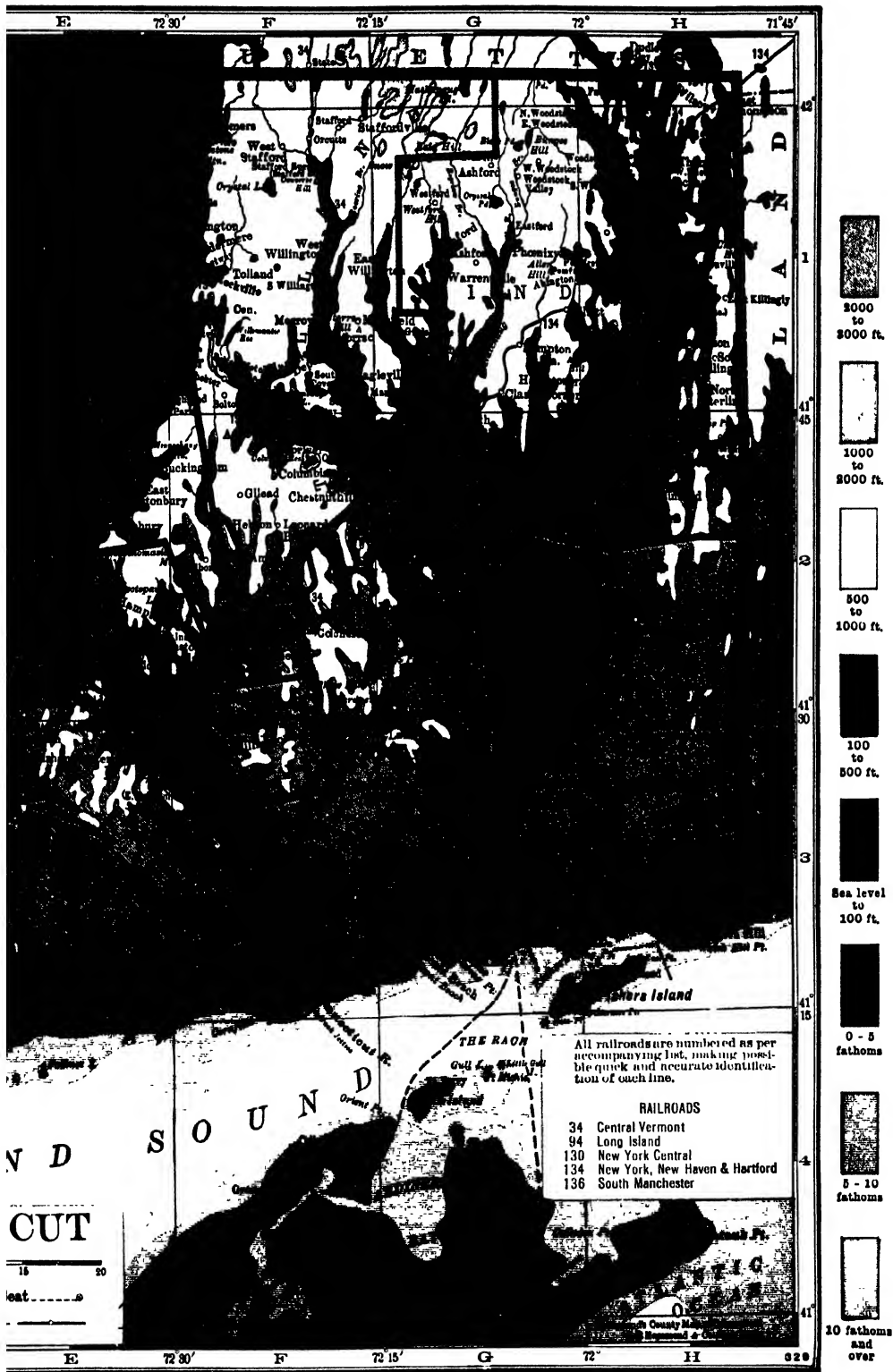
Agriculture. The best agricultural lands in the state are sandy, loamy, or clay soil, and these are chiefly in the Connecticut River basin and the smaller valleys of the highlands.

CONNECTICUT

Abington, (G1)	223	Chaplin, (G1)	385	Easton, (B3)	1,017	Hamburg, (F3)	260	Marion, (D2)	280
Addison, (E2)	300	Cheshire, (D3)	855	East River, (E3)	300	Hamden, (D3)	8,611	Marlboro, (F2)	303
Albiontown, (C4)	300	Chester, (F3)	1,675	East Thompson, (H1)	280	Hampton, (G1)	475	Massapeag, (G3)	100
Andover, (F2)	389	Chesterfield, (G3)	270	East Wallingford, (D3)	150	Hanover, (G2)	400	Mechanicsville, (H1)	600
Ansonia, (C3)	17,643	Chestnut Hill, (F2)	100	East Willington, (G1)	150	HARTFORD, (E1)	138,036	Melrose, (E1)	130
Ashford, (G1)	673	Clarks Falls, (H3)	280	East Windsor, (E1)	3,741	Hartland, (E1)	448	Meriden, (D2)	29,867
Aspetuck, (B4)	150	Clinton, (E3)	1,217	East Windsor Hill, (E1)	350	Harwinton, (C1)	2,020	Merron, (F1)	100
Avon, (D1)	1,534	Clintonville, (D3)	250	East Woodstock, (G1)	280	Hawleyville, (B3)	600	Mianus, (A4)	500
Bakersville, (C1)	200	Colchester, (F2)	913	Ekono, (H2)	130	Hazardville, (E1)	1,200	Middlebury, (C2)	1,067
Ballouville, (H1)	250	Colebrook, (C1)	275	Ellington, (F1)	2,127	Hebron, (F2)	915	Middlefield, (E2)	1,047
Baltic, (G2)	750	Colebrook River, (C1)	492	Elliott, (G1)	125	Higgenum, (F3)	1,000	Middle Haddam, (E2)	550
Bantam, (B2)	608	Collinsville, (D1)	2,500	Elmwood, (E2)	300	Highland Park, (F1)	200	Middletown, (E2)	13,638
Barkhamsted, (D1)	719	Columbia, (F2)	706	Enfield, (E1)	11,719	High Ridge, (A4)	540	Milford, (C4)	10,193
Beacon Falls, (C3)	1,593	Comstocks Bridge, (F2)	200	Essex, (F3)	2,815	Highwood, (D3)	150	Milldale, (D2)	350
Bean Hill, (G2)	450	Cornwall, (B1)	834	Fairfield, (B4)	11,475	Hockanum, (E2)	250	Millington, (F3)	100
Berlin, (E2)	4,298	Cornwall Bridge, (B1)	100	Falls Village, (B1)	600	Hopewell, (E2)	100	Mill Plain, (A3)	350
Bethany, (D3)	411	Cornwall Hollow, (B1)	100	Farmington, (D2)	1,021	Iop River, (E2)	100	Millstone, (G3)	180
Bethel, (B3)	3,201	Coscob, (A4)	500	Fenwick, (F3)	13	Hotchkissville, (C2)	250	Milton, (B1)	100
Bethlehem, (C2)	536	Coventry, (F1)	1,582	Fitchville, (G2)	150	Hurlbut, (B4)	190	Minorotown, (C2)	160
Black Hall, (F3)	220	Cranbury, (B4)	500	Forestville, (D2)	3,400	Ivoryton, (F3)	350	Mohegan, (G3)	220
Bloomfield, (E1)	2,394	Crescent Beach, (G1)	100	Franklin, (G2)	552	Jewett City, (H2)	3,196	Monroe, (C3)	1,161
Boardman, (B2)	200	Cromwell, (J2)	2,454	Gales Ferry, (G3)	125	Kensington, (D2)	1,950	Montwese, (D3)	400
Bolton, (F1)	448	Danbury, (B3)	18,943	Gardner Lake, (G3)	130	Kent, (B2)	1,086	Montville, (G3)	3,411
Botsford, (B3)	350	Danielson, (H1)	3,130	Gaylordsville, (A2)	275	Kent Furnace, (B2)	180	Moodus, (F2)	950
Bozrah, (G2)	858	Darien, (B4)	4,184	Georgetown, (B3)	700	Kibbe, (E1)	100	Moosup, (H2)	2,300
Bozrahville, (G2)	200	Dayville, (H1)	950	Gildersleeve, (E2)	979	Killingly, (H1)	8,178	Morris, (C2)	499
Branchville, (B3)	175	Deep River, (F3)	1,380	Gilead, (F2)	350	Killingworth, (E3)	531	Mount Carmel, (D3)	500
Branford, (D3)	2,619	Derby, (C3)	11,238	Glasgo, (H2)	700	Lakeville, (B1)	750	Mystic, (H3)	3,900
Bridgeport, (B4)	143,555	Durham, (E3)	959	Glastonbury, (E2)	5,592	Lauriglen, (H3)	160	Naugatuck, (C3)	15,051
Bridgewater, (B2)	481	Eagleville, (F1)	300	Glenbrook, (A4)	450	Lebanon, (G2)	1,343	New Boston, (H1)	100
Bristol, (D2)	20,620	East Berlin, (E2)	700	Glenbrook, (A4)	450	Ledyard, (G3)	1,161	New Britain, (D2)	59,316
Broad Brook, (E1)	1,400	East Canaan, (B1)	500	Goshen, (C1)	675	Leonard Bridge, (F2)	150	New Canaan, (A4)	1,918
Brookfield, (B3)	896	Eastford, (G1)	496	Granby, (D1)	1,342	Lime Rock, (B1)	450	New Fairfield, (B3)	468
Brookfield Center, (B4)	350	East Glastonbury, (E2)	350	Greenfield Hill, (D4)	900	Lisbon, (H2)	867	New Hartford, (D1)	1,781
Brooklyn, (H1)	1,655	East Granby, (H1)	1,056	Greens Farms, (B4)	125	Litchfield, (C2)	707	New Haven, (D3)	162,537
Buckland, (E1)	300	East Haddam, (F3)	2,312	Greenwich, (A1)	5,939	Long Hill, (C3)	400	Newington, (E2)	2,381
Burlington, (D1)	1,109	East Hampton, (F2)	2,394	Griswold, (H2)	1,220	Longridge, (B4)	430	Newington Jc., (F2)	200
Burnside, (E1)	980	East Hartford, (F1)	11,648	Grosvener Dale, (H1)	800	Lyme, (F3)	674	New London, (G3)	25,688
Burrville, (C1)	150	East Hartland, (D1)	300	Groton, (G3)	4,236	Madison, (E3)	1,857	New Milford, (B2)	4,781
Campville, (C2)	100	East Haven, (D3)	3,520	Grovebeach, (F3)	100	Manchester, (E1)	18,370	New Preston, (B2)	450
Canaan, (B1)	561	East Killingly, (H1)	700	Gulford, (D3)	1,612	Manchester Green, (F1)	300	Newtown, (B3)	426
Cannondale, (B4)	200	East Litchfield, (C1)	100	Guileville, (G1)	230	Mansfield, (F1)	2,574	Niantic, (G3)	1,200
Cantbury, (H2)	896	East Lyme, (G3)	2,291	Haddam, (F3)	1,736	Mansfield Center, (G1)	350	Nichols, (C4)	300
Canton, (D1)	2,549	East Morris, (C2)	100	Haddam Neck, (E2)	230	Mansfield Depot, (F1)	250	Noank, (H3)	1,100
Canton Center, (D1)	200			Hallville, (G2)	400	Marble Dale, (B2)	200	Norfolk, (C1)	1,226
Center Brook, (F3)	300							Noroton, (A4)	600
Center Groton, (G3)	500							Noroton Heights, (A4)	500
Central Village, (H2)	1,000							North Ashford, (G1)	140
Chatham, (E2)	320								

■ = Population of township





CONNECTICUT *Continued*

North Branford, (D3)	1,110	Pine Meadow, (C1)	150	Sharon, (B1)	1,585	Suffield, (E1)	4,070	West Hartford (E1)	8,854
North Canton, (D1)	100	Pineorchard, (D3)	500	Sharon Valley, (D1)	300	Taconic, (B1)	200	West Hartland (D1)	120
Northfield, (C2)	600	Plainfield, (H2)	7,926	Shelton, (C3)	9,475	Taftville, (G2)	4,500	West Haven, (D3)	12,400
Northford, (D3)	370	Plainville, (D2)	4,114	Sherman, (A2)	533	Talcottville, (F1)	475	Westminster, (B2)	200
North Franklin, (G2)	550	Plattsville, (B4)	310	Short Beach, (D4)	300	Tariffville, (D1)	600	West Morris, (B2)	100
North Granby, (D1)	420	Pleasant Valley, (D1)	300	Silver Mine, (B4)	400	Terryville, (C2)	2,400	West Mystic, (H3)	100
North Grosvenor Dale, (H1)	2,500	Plymouth, (C2)	5,942	Simsbury, (D1)	2,958	Thompson, (H1)	5,055	West Norfolk, (C1)	100
North Guilford, (E3)	500	Pomfret, (H1)	1,454	Somers, (F1)	1,673	Thompsonville, (E1)	6,000	West Norwalk, (B4)	703
North Haven, (D3)	1,968	Pomfret Center, (H1)	306	Somerville, (F1)	880	Tolland, (F1)	1,040	Weston, (B4)	114
North Kent, (B1)	100	Poquetanuck, (G3)	500	Sound Beach, (A4)	1,000	Torrington, (C1)	20,623	Westport, (B4)	5,114
North Lyme, (F3)	100	Poquonock, (E1)	900	South Britain, (B1)	450	Tracy, (D2)	170	West Redding, (B3)	180
North Madison, (E3)	100	Poquonock Bridge, (G3)	250	Southbury, (C3)	1,093	Turnbull, (C4)	2,597	West Simsbury, (D1)	200
North Ridgefield, (A3)	140	Portland, (E2)	3,644	South Cheshire, (D3)	200	Turnerville, (F2)	150	West Stafford, (F1)	240
North Stamford, (A4)	860	Preston, (H2)	2,743	South Coventry, (F1)	950	Tyler City, (C3)	150	West Suffield, (E1)	820
North Sterling, (H1)	130	Prospect, (D2)	266	South Glastonbury (E2)	1,100	Tylerville, (E3)	100	West Thompson, (H1)	150
North Stonington, (H3)	1,144	Putnam, (H1)	7,711	Southington, (D2)	5,085	Uncasville, (G3)	670	West Torrington, (C1)	460
Northville, (B2)	275	Quaker Hill, (G3)	180	South Killbuckly, (H1)	150	Union, (G1)	257	West Willington, (F1)	150
North Westchester (F2)	250	Quinebaug, (H1)	300	South Lyme, (F3)	175	Union City, (C3)	4,002	West Woodstock, (G1)	280
North Wilton, (B4)	400	Rainbow, (E1)	100	South Manchester, (E1)	9,000	Univille, (C2)	2,200	Wethersfield, (E2)	4,342
North Windham, (G2)	200	Redding, (B3)	1,315	South Meriden, (D2)	100	Vernon, (F1)	8,898	Whitneyville, (D3)	300
North Woodbury, (C2)	350	Redding Ridge, (B3)	240	Southport, (B4)	1,200	Vernon Center, (F1)	190	Willmantic, (G2)	12,300
North Woodstock, (G1)	280	Reynolds Bridge, (C2)	200	South Wethersfield, (E2)	175	Versailles, (G2)	100	Willington, (F1)	1,200
Norwalk, (B4)	27,743	Ridgebury, (B3)	100	South Wallington, (F1)	250	Vinton Mills, (E1)	100	Wilsonville, (H1)	220
Norwich, (G2)	29,685	Ridgefield, (A3)	1,030	South Wilton, (B4)	210	Voluntown, (H2)	656	Wilton, (B4)	1,284
Oakdale, (G3)	330	Riversbank, (A4)	300	South Windham, (G2)	400	Wallingford, (D3)	9,648	Winchester, (C1)	9,019
Oakville, (C2)	950	Riverside, (A4)	250	South Windor, (E1)	2,142	Wapping, (F1)	550	Winchester Center, (C1)	960
Occum, (G2)	300	Riveron, (C1)	200	South Woodstock, (H1)	280	Warehouse Point, (E1)	1,250	Windham, (G2)	13,801
Old Lyme, (F3)	946	Rockfall, (E2)	200	Springdale, (A4)	540	Warren, (B2)	320	Windsor, (E1)	5,620
Old Mystic, (H3)	400	Rockville, (F1)	7,726	Stafford, (F1)	5,407	Warrenville, (G1)	100	Windsor Locks, (E1)	3,554
Old Saybrook, (F3)	1,463	Rockyhill, (E2)	1,633	Stafford Spgs., (F1)	3,383	Washington, (B2)	1,619	Windsorville, (F1)	250
Oneco, (H2)	410	Roundhill, (A4)	100	Staffordville, (F1)	450	Washington Depot, (B2)	400	Winnipauk, (B4)	600
Orange, (C3)	16,614	Roxbury, (B2)	647	Stamford, (A4)	35,096	Waterbury, (C2)	91,715	Winsted, (C1)	8,248
Orehill, (B1)	120	Roxbury Falls, (B2)	100	Stamford, (A4)	500	Waterford, (G3)	3,935	Wolcott, (D2)	719
Oranogue, (C4)	100	Roxbury Station, (B2)	300	Stepney, (B3)	300	Watertown, (C2)	6,050	Woodbridge, (D3)	1,170
Oxford, (C3)	998	Salem, (F3)	424	Stepney Depot, (C3)	225	Waterville, (C2)	3,000	Woodbury, (C2)	1,698
Packer, (H2)	200	Salisbury, (B1)	2,497	Sterling, (H2)	1,266	Waukegan, (H2)	400	Woodmont, (D4)	220
Pequabuck, (D2)	350	Sandy Hook, (B3)	1,000	Stevenson, (C3)	150	Weatogue, (D1)	100	Woodstock, (G1)	1,767
Phoenixville, (G1)	100	Sanford, (B3)	340	Still River, (B2)	300	West Ashford, (G1)	100	Woodstock Valley, (G1)	280
		Saugatuck, (B4)	900	Stonington, (H3)	2,100	West Brookfield, (F3)	849	Yalesville, (D3)	1,500
		Savbrook, (F3)	2,325	Stony Creek, (E3)	1,200	West Cheshire, (D2)	300	Yantic, (G2)	600
		Scitico, (E1)	540	Storrs, (F1)	200	Westchester, (F2)	100		
		Scotland, (G2)	391	Stratford, (B4)	12,347	West Cornwall, (B1)	350		
		Seymour, (C3)	6,781			Westford, (G1)	100		
		Shallerville, (E3)	100			West Goshen, (C1)	175		
		Shaker Station, (E1)	100			West Granby, (D1)	320		

■ = Population of township

From colonial times, the number of farms has rapidly decreased as agriculture has given way to other industries. Almost half of the farms are owned by foreigners, who are reclaiming the "abandoned farms" characteristic of New England. Forage crops are of high importance. The tobacco crop ranks first; the mild-flavored "domestic" leaf of high quality provides the famous "Connecticut wrappers" for cigars.

Near the large cities market-gardening is important. Of the commercial fruit crops, strawberries, raspberries, apples, and peaches are most valuable. The hilly areas are suitable for peaches, since they sometimes escape the frosts which occur in the fertile valleys. Potatoes are the largest vegetable crop.

Dairying is the most important agricultural industry. There is an abundance of good pasture land, and some silage crops are grown, while the nearness of large city markets creates a demand for all dairy products, and also for poultry products.

In fisheries, Connecticut ranks third among the New England states. Recent legislation has been passed to protect the industry. Although shut off from the ocean by Long Island, Connecticut finds the sheltered waters of the Sound well suited to the valuable oyster industry.

Mineral Resources. Although Connecticut has deposits of various minerals, only a few are extensive enough to warrant working. Much of the feldspar produced in the United States is from Connecticut. Kaolin is mined for sale to porcelain manufacturers, and limestone and asbestos are quarried. Though of little importance now, iron mines have been worked since 1732; they furnished material for cannons and ammunition during the Revolutionary War. The iron for the anchor of the famous frigate *Constitution*, popularly known as "Old Ironsides," came from Connecticut.

Industries. In its early years, Connecticut was an agricultural state. To-day, with the aid of plentiful capital furnished by the insurance companies—for which Connecticut is a center—and with natural water power, the industries of the state are of chief importance. In colonial times, clocks, tinware, and "Yankee notions" were hand-manufactured and sold from peddlers' packs—perhaps even the fabled wooden nutmegs which have given the state its nickname of **NUTMEG STATE**; to-day over 1,200 kinds of products are listed as regular manufactures.

Over a hundred years ago, brass buttons were made at Waterbury; this led to the rolling of brass and the manufacture of many other articles, until now the largest part of all the brass for the United States is rolled in Con-

necticut, in the Naugatuck Valley. There are many factories making locks, bolts, hinges, and other items of hardware. Dressmakers look to Connecticut for the pins they daily use. Meriden produces more silverware and silver-plated ware than any other city in America. Motor boats and launches are manufactured in the coast cities. Hats, caps, and the machinery for their manufacture are important industries at Danbury and Norwalk. At Thompsonville are the largest carpet factories in the world, and the silk textile mills of South Manchester are world-famous.

In the latter part of the eighteenth century, silkworms were raised successfully at Windham and Mansfield, and although the silkworm industry has vanished, much of our silk cloth comes from large mills near Hartford. The first American sewing silk was made at Mansfield. One of the largest thread mills in New England is located at Willimantic, where strong cotton thread for sewing machines was first made. The natives who scoffed at the famous clock-maker, Eli Terry, as he peddled his wooden clocks, and who prophesied ruin when he began to make clocks in lots of a hundred or more, would be astonished if they could return to see the modern factories of Connecticut turning out clocks and watches by the hundred thousands, to supply three-fourths of the United States' demand.

Transportation and Commerce. Excellent facilities for transportation have also aided the development of all industries. Over 900 miles of railroad afford direct connection with every part of the country, the largest railroad being the historic New York, New Haven & Hartford. There are over 1,500 miles of electric street railway and a statewide system of the finest highways, including 2,000 miles of improved roads. The electric roads operate many busses, but there are also bus lines in the state operated by other agencies.

Hartford, the capital, is at the head of navigation of that important avenue of transportation and commerce, the Connecticut River. In recent years, improvements in the river below that city have been made by the United States government.

Bridgeport, New Haven, New London, and several other seaports are conveniently located, and have harbors which are ample for all necessary shipping. In the early years of the eighteenth century, West Indian commerce made these coast towns busy trading centers. Wagons, drawn by horses or oxen, came from every quarter with loads of wheat, corn, hams, cheese, and butter, to be exchanged for sugar, molasses, and Barbados rum.

The Revolution put an end to the trade, and the towns slept until the first of the nineteenth century, when the whaling industry awakened them. For years, New London was

one of the busiest whaling ports in the world. As fast as hands could work, barrels were made ready for the precious oil; ships were built, bought, and outfitted. The crews of the whalers shared in the profit as well as the danger of the voyages, which sometimes took them half around the world. Unlike the West Indian trade, which had made a few men very wealthy, the whales brought prosperity to the community. And the wealth that came from the sea furnished much of the capital for the manufacturing industries which are now so important.

Inventors and Their Inventions. From the busy, intelligent early settlers of Connecticut sprang many inventive geniuses. Eli Terry, Seth Thomas, and others improved the art of clockmaking. Elias Howe invented the sewing machine at New Hartford, while Wheeler and Wilson gave the world improved sewing machines; John Fitch was the first to apply steam to navigation; Charles Goodyear developed his process of rubber vulcanizing; Samuel Colt invented the revolver.

Government. The constitution of the state, adopted in 1818, is still the basic law; it has received amendments. The executive officers are the governor, lieutenant governor, secretary, treasurer, and comptroller. The general assembly constitutes the legislative department. It consists of a senate of thirty-five members and a house of representatives of 262 members, all elected for two years, at a salary of \$300 each for regular sessions and mileage for extra sessions.

Among other powers, the general assembly may grant divorces, confirm titles, and annul decisions of minor justices. The judicial department consists of a supreme court of errors with a chief justice and four associate justices, who serve eight years; a superior court with six judges, who also serve eight years; and in some of the principal cities, inferior courts of common pleas, whose judges serve four years. The governor nominates and the legislature appoints all judges.

In addition to certain other requisites, such as age, term of residence, and moral character, the electors must be able to read any article of the Constitution of the United States or any section of the state statutes.

History. The first settlement was a Dutch trading post at Hartford, in 1633. In the same year, Windsor was settled by a trading company from Plymouth, which in 1635 sold out to settlers from Dorchester. But the English had become interested in the region, and the land from Narragansett Bay to the Pacific, having been granted to Lord Saye and Sele and others in 1631, John Winthrop, Jr., was sent from England as governor. He immediately built a fort at Saybrook, to prevent the Dutch from getting control of Connecticut,

and gave settlers who had previously located at Windsor, Wethersfield, and Hartford permission to remain. Gradually breaking away from the strict Puritan government in Massachusetts, various ministers and their congregations migrated to the Connecticut Valley. Soon the Connecticut colony numbered 800 people, including the towns of Windsor, Wethersfield, and Hartford. In 1639 the people of these towns framed laws, called Fundamental Orders, for governing the colony. While not strictly a constitution, in the modern sense of the word, these Orders are known as the first written constitution in America, and give the state its name of CONSTITUTION STATE. This constitution is claimed also to be the first in the history of the world to be formed by social compact. The name of the state was taken from the Indian name for the Connecticut River, meaning *long river*.

In the meantime another colony, known as the New Haven Colony, was established with a strict government, based on the Scriptures. It included New Haven, Milford, Guilford, Stamford, and Southold. Though occasionally disturbed by Pequot Indians and the Dutch, both colonies expanded, and Connecticut became known as one of the most prosperous and liberal of the New England colonies. By purchase and colonization, it gradually gained possession of most of the present state, and in 1662, under a charter secured from Charles II, absorbed the New Haven colony. This charter served as its constitution when it became a state in 1776, and was retained until 1818, when a new one was adopted. Tradition tells that when Governor Andros demanded the Connecticut charter, in 1687, it was hidden in the hollow trunk of the famous Charter Oak and remained there until 1693.

During the Revolutionary War, Connecticut earned the name PROVISION STATE, for troops and supplies were generously furnished. Its war governor, Jonathan Trumbull, one of the closest friends and advisers of Washington, was the only colonial governor who was not asked to resign at the outbreak of the Revolution. During the war, the British burned Danbury, in 1777, and raided New Haven, in 1779. Forts Griswold and Trumbull were taken by the traitor Benedict Arnold in 1781.

Through the influence of delegates from Connecticut at the Constitutional Convention in 1787, the present system of representation in Congress was adopted. Connecticut opposed the War of 1812, and its capital was the seat of the Hartford Convention. Although Hartford and New Haven were joint capitals of Connecticut for many years, in 1873 the former became the sole capital. In 1881 the long-disputed western boundary was definitely settled.

The progress of Connecticut in reforms has been shown by the passage of pure-food

CONNECTICUT

N.Y.

R.I.

Norwalk

Long Island Sound
Long IslandCITIES ON
THE SOUND

1638



Connecticut's First Church, Hartford

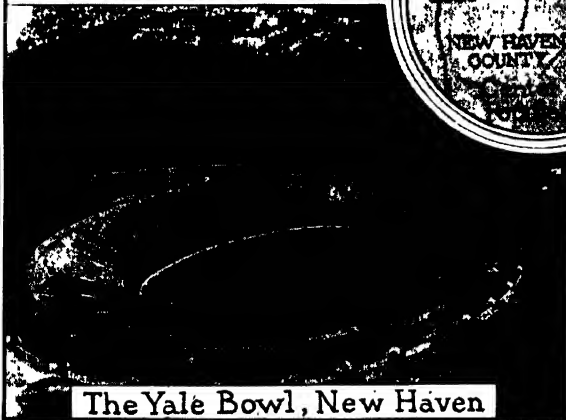
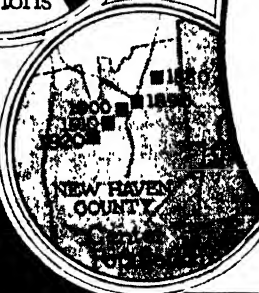
First Law School in the United States
Established at Litchfield in 1784Tobacco
PlantRoman-
Catholic

Religions

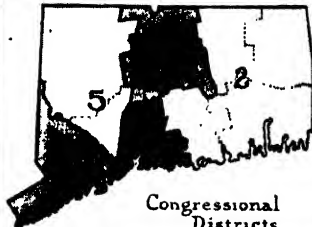
Episcopal

Baptist

Lutheran

An
Insurance
Building,
Hartford

The Yale Bowl, New Haven

Congressional
Districts

laws, the authorization of a public-utilities commission, workingmen's compensation act, and a department of Americanization. A.B.M.

Other Items of Interest. It was in Connecticut that the famous Blue Laws, with their over-strictness, were long supposed to have been in force, but it was later discovered that many of these were the invention of an exiled colonist whose purpose was ridicule. See BLUE LAWS.

About 1678, death was the punishment by law for blasphemy; no case seems recorded, however, of the penalty being inflicted.

Episcopalians were not allowed in Connecticut until after 1708, nor allowed to vote until after 1752.

Waterbury, where the "dollar watch" originated, had the first watch-crystal factory in America.

Connecticut claims the honor of having had the first law school (1784), the first school for girls (1792), and the first agricultural experiment station (1875) in the United States.

The name *Brother Jonathan*, popularly applied to the United States, is said to have been derived from that of Jonathan Trumbull, war governor of Connecticut.

As early as 1732, the territory was manufacturing men's hats in such quantities that the hat-makers of London complained that imports from Connecticut were ruining their business.

The Declaration of Independence was never proclaimed in Connecticut, because sixteen days prior to its promulgation Jonathan Trumbull had issued one so nearly the same that the Philadelphia declaration was considered superfluous.

The first protective tariff legislation in America was passed when Connecticut, from 1640 to 1645, provided a fine of five shillings to the pound for use of other than Connecticut-grown tobacco.

Related Subjects. The articles on the following topics will furnish more detailed information as to certain phases of the geography, the industrial life, and history of Connecticut:

CITIES AND TOWNS

In addition to the following cities which are described in these volumes, others are listed on the back of the state map.

Bridgeport	New Britain
Hartford	New Haven

LEADING PRODUCTS

Brass	Oyster
Bronze	Silk
Clock	Thread
Feldspar	Tobacco

RIVERS

Connecticut	Housatonic
-------------	------------

UNCLASSIFIED

Berkshire Hills	Goodyear, Charles
Charter Oak	Hartford Convention
Constitution, The	Howe, Elias
Green Mountains	Long Island Sound
Fitch, John	Yale University

Questions on Connecticut

An Outline suitable for Connecticut will be found with the article "State."

Name some of the inventors who have helped to make Connecticut a great manufacturing state.

What was the origin of the name of the state?

Why was the Declaration of Independence never proclaimed in the state?

What unusual requirement as to education applies to the electorate of the state?

How is the name Andros linked to the history of Connecticut?

What single river of importance flows through the state?

How old was the colony when it established its first institution of higher learning?

How many times as high as the loftiest point in this state is the highest point in Colorado? In Montana?

Could a foreigner who had never learned to read English be naturalized in this state?

Give three popular names which are applied to the state, and tell the origin of each.

For what use is the tobacco of Connecticut especially suited? How many states surpass Connecticut in tobacco production?

Describe the state flag

How well does the state care for the defective and unfortunate elements of its population?

To what native of this state do you owe the fact that you can so easily keep your feet dry when you go out in the rain?

How much is spent on education each year?

From what was the larger part of the school fund secured?

How much did the state suffer during the Revolutionary War?

If the populations of Connecticut and Chicago were exchanged, would the state be more or less densely populated than it is at present?

What sea-food could the state least afford to dispense with? How many states surpass Connecticut in value of fisheries? Which are they?

What unusual power has the legislature of this state?

Irrigation necessary anywhere in the state?

In what way would the climate be different if the prevailing winds came from the north and northwest?

What part has the Federal government had in bettering the facilities for commerce in the state?

How far beyond the present boundaries of the state did the original grant of territory extend?

What part did Connecticut have in the construction of one of the most famous ships ever built in the United States?

How large a proportion of the people live under rural conditions?

What part did the Charter Oak play in the history of Connecticut? What became of it afterward?

What decided change has taken place since colonial days in the relative importance of the various industries?

How many states are smaller than Connecticut? How many are more densely populated? How many have had a longer existence?

Has there been any change since early days in the predominant religion of the state? What has caused it?

What two industries brought wealth to the coast towns in the early eighteenth and nineteenth centuries?

CONNECTICUT AGRICULTURAL COLLEGE. See **CONNECTICUT** (Education).

CONNECTICUT COLLEGE FOR WOMEN. See **CONNECTICUT** (Education).

CONNECTICUT RIVER, the longest waterway of the New England states, rises far to the north, in New Hampshire. It flows southward between New Hampshire and Vermont, through Western Massachusetts and the central part of Connecticut, and finds an outlet to the sea through Long Island Sound. It is nearly 400 miles long, and drains an area of over 11,000 square miles. The valley of the Connecticut is famed for its beauty and fertility, and the stream flows through one of the most prosperous manufacturing sections in the United States. Numerous falls along its course furnish water power, and have determined the location of thriving industrial centers. Between Hartford and the Sound, a distance of fifty miles, the river is navigable for large steamers, and beyond that point for some distance into Massachusetts, it has been made navigable for smaller boats by means of canals. See **CONNECTICUT**; **VERMONT**.

CONNELLSVILLE, *kon' elz vil*, PA. See **PENNSYLVANIA** (back of map).

CONNOR, RALPH, pen name of Charles William Gordon (which see).

CONRAD, JOSEPH (1857-1924), an English novelist of Polish ancestry, a master writer of tales of the sea which laid emphasis upon the moral qualities of life. He wrote little until he was nearly forty years old, thus finding his real work comparatively late in life. What is held to be remarkable is that he became recognized as a stylist in a language of which he knew nothing until he was twenty.

Conrad's real name was **THEODOR JOSEF KONRAD KORZENIOWSKI**, which he Anglicized when he turned to literature. Reared amid disorders, his father having been a Polish revolutionist, his childhood was eventful, and there was bred in him a desire for adventure—particularly did the sea attract him. He was a Russian soldier against the Turks, then joined the French merchant marine, and for twenty years was a sailor. On the occasion when his ship first visited England, he began to study English. In the Congo, in 1894, a fever attacked him; during convalescence he recorded some of his adventures in a story,

and was surprised when his manuscript was accepted by a publishing firm. Then he determined upon a literary career. Stories were produced in rapid succession; they were largely pen pictures of his experiences. They have a remarkably wide range of admirers. His adventurous tales of the sea and strange lands and peoples appeal to every class—to the careless reader for their stirring adventure, and to the cultured for their careful English and keen, detached analysis of character. The sea, brooding and mysterious, and the East, fatalistic and contemplative, absorbed Conrad for many years, and gave color to his life and writings. Literary critics have given him a high place among the great romantic writers of all time, but his own career is his greatest story, a climax of romance and realism.

His Most Important Books. *Almayer's Folly* (1895); *An Outcast of the Islands* (1896); *The Nigger of the Narcissus* (1897), published in the United States as *Children of the Sea*; *Tales of Unrest* (1898); *Lord Jim* (1900); *The Inheritors*, with F. M. Hueffer (1901); *Typhoon* (1902); *Youth and Other Tales* (1902); *The Mirrors of the Sea* (1906); *A Set of Six* (1908); *Point of Honor* (1909); *Under Western Eyes* (1911); *'Twixt Land and Sea* (1913); *Chance* (1914); *Within the Tides* (1915); *The Rover* (1923).

CONSANGUINITY. See **MARRIAGE**.

CONSCIENCE MONEY. See **MONEY** (Unusual Terms Applied to Money).

CONSCRIPTION, *kon skrip' shun*, OR **DRAFTING**, a term generally applied to enforced enlistment in army or navy. From the days of the ancient Romans, in one form or another, it has been practiced in Europe. The modern form of conscription, by which every citizen between certain ages who is physically fit to do so is compelled to serve in the army, was first introduced by France. It was an indirect result of the French Revolution, which almost stopped voluntary recruiting. Partial conscription did not meet the requirements, and in 1792 a law was passed compelling all citizens to undergo military training. Conscription, or compulsory military service, was quickly adopted in nearly all European countries, the usual term of service being three years. There are, however, many variations of the system. Germany as a political power derived great benefits from conscription. Many authorities trace the marked progress of that country from the Franco-German War to 1914 to the compulsory military system and the order evolved by military training and discipline. In Canada and Great Britain, conscription in the European sense had been avoided until 1917, when the extraordinary demand for millions of men in the World War led both countries to resort to conscription. The Home Rule element in Ireland and the French-Canadians of Quebec opposed the act; in the city of Quebec, riots occurred.



Photo Wide World
JOSEPH CONRAD

Conscription in the United States. During the War of Secession, the Federal government was forced to resort to conscription, but the term of service ended at the close of the war. With the entry of the country into the World War, in 1917, the government was confronted with the question of providing a large army in the shortest possible time. While the voluntary system had many eminent advocates, the pressing need for an army turned the balance in favor of compulsory service, and in May a conscription law passed both houses of Congress. Opposition was voiced by a negligible minority.

The law provided that all civilian male citizens between the ages of twenty-one and thirty should be registered for military service; that the first draft of 500,000 should be selec-

tive, occupation to determine exemptions; that the quota of each state should be fixed in relation to that state's proportion of the population of the United States; that no substitute should be allowed, and that the total draft might call one million men to the colors. The same law fixed the size of the regular army at 293,000 and of the National Guard at 330,000; it placed the possible total of the armed forces of the United States at 1,900,000 men, and increased the pay of enlisted men from \$15 per month to \$30.

The exempted classes included the Vice-President, officers of the United States and of the several states; members of religious organizations whose creeds oppose warfare; and ministers. Provisional exemptions might be made by the President.



CONSERVATION, which means, literally, "the preserving from waste or injury," is applied very generally at the present time to the safeguarding of a nation's natural resources. In this sense, however, much more than preservation is implied. Conservation of natural resources includes also development, prudence, economy, and foresight in caring for nature's bountiful gifts. It is the sacred duty of each generation to care for these gifts, so that they may be available for the generations to come. In the words of Gifford Pinchot, late governor of the state of Pennsylvania, and one of the world's foremost authorities on the subject, "Conservation is the greatest good to the greatest number for the longest time."

The natural resources upon which man depends for his existence are water, forests, minerals, and the fertility of the soil. Of these, water is the only one whose supply can be said to be inexhaustible. Yet its unequal distribution, its tremendous powers of destruction in time of flood, and its wonderful possibilities in furnishing power make its use and control one of the important problems of conservation. Surplus water must be stored and made available in time of drought; forest areas that retain the water that would otherwise cause the streams to overflow their banks must be protected from the lumberman's ax; water power must be developed and be protected from private exploitation; streams must be purified for water supply; and swamp and overflow lands must be drained and made useful.

Forests, minerals, and products of the soil all belong to the resources which are limited in their supply. The destruction of vast quantities of timber, through the ax and the flames of forest fires, went on century after century before the world came to a realization of the danger that menaced one of its most valuable assets. In many of the countries of Europe, adequate systems of conserving the forest areas have been devised, and in this work Germany carries off first honors. Every German state has its forest organization, and there are in the country several schools of forestry. France established a school of forestry at Nancy in 1824, and its Department of Forestry has an admirable system of replanting and cultivating timber lands.

Of the minerals, coal is the most important from an industrial standpoint. This valuable fuel has for years been mined as if the supply were inexhaustible, and official figures show that there has been about one ton wasted to every ton mined. It has been the policy to leave in the ground whatever is not easily mined and to ignore vast quantities of a lower grade, much of which has been made inaccessible by the caving in of abandoned shafts. Through the conservation movement, man is learning how to mine coal with less waste, and he is learning another lesson, equally important, that water power may be utilized to develop electrical energy and thus lessen the consumption of coal. Wherever electric power generated by water is used instead of steam for transportation, heating, or factory purposes,

there is a proportionate saving of the world's coal supply.

Conservation in the United States. In America, the conservation movement had its birth in the movement to save the forests, the rapid destruction of which was pointed out as early as 1873 by the American Association for the Advancement of Science. As a result of the agitation then begun, a Bureau of Forestry was created in the Department of Agriculture, and in 1891 the government began to set apart national forest reserves. At the present time the United States has about 150,000,000 acres of national forest area.

The White House Conference. It was fortunate for the conservation movement that when public sentiment was becoming thoroughly aroused on the subject, open-minded and far-seeing statesmen were in national official positions. Acting on Gifford Pinchot's suggestion, President Roosevelt brought the underlying forces of the movement to a focus by calling, in May, 1908, a White House conference, or "Conference of the Governors." This historic assembly, which marked the beginning of a definite and recognized public policy in regard to the preservation of the country's resources, was attended by governors from thirty-four states and by numerous distinguished men interested in the movement.

Shortly after the White House conference, President Roosevelt created a National Conservation Commission, consisting of forty-nine men prominent in political affairs, the industries, and science. This commission was divided into four sections, which reported respectively on minerals, waters, forests, and soils. The results of their investigations, published in 1909, gave the United States the first inventory of natural resources possessed by any nation, for the report contains a statement as to the country's natural wealth, the amounts already used, and the probable duration of their future life.

What Has Been Accomplished. During Roosevelt's administration, more than 234,000,000 acres of the government domain, including timber, coal, and phosphate lands, and lands containing valuable water-power sites, were withdrawn from the possibility of private ownership. This is representative of the present policy of the government, and is one of the most important results of the conservation movement. Another achievement of the conservationists is the construction of a government railroad in Alaska; this must give a tremendous impulse to the development of its rich coal lands (see ALASKA). Each President since Roosevelt has done his part in conserving the nation's natural resources, and since oil has become such a factor in world affairs, the United States has set aside oil reserves for

the sole use of its navy. Not the least striking evidence of the force of the conservation movement is the failure of private interests to defeat or weaken the government policy of preserving from waste and despoliation the magnificent resources on which the future welfare of the nation depends.

Super-Power. For the newest development of water power, see that article.

North American Conservation Conference. President Roosevelt was authorized by the National Conservation Commission to invite Canada and Mexico to join with the United States in a movement for the conservation of the resources of the entire American continent. In February, 1909, the North American Conference, consisting of three commissioners from each of the countries represented, met in Washington. Harmony prevailed throughout the sessions, and among the valuable plans outlined was the suggestion that steps be taken to make the conservation movement world-wide in scope.

Conservation in Canada. In 1909, the Dominion Parliament passed an act creating a Commission of Conservation for Canada. The aims of this Commission were stated as follows:

It shall be the duty of the Commission to take in consideration all questions which may be brought to its notice relating to the conservation and better utilization of the natural resources of Canada, to make such inventories, collect and disseminate such information, conduct such investigations, inside and outside of Canada, and frame such recommendations as seem conducive to the accomplishment of that end

Thirty-two members make up this Commission; of these, the Minister of the Interior, the Minister of Mines, and the member of each provincial government in Canada who is charged with the administration of the natural resources of the province are members by virtue of their office. The important subjects upon which the Commission is working are the protection of the standing timber throughout the Dominion, the conservation of water supply and its relation to the forests, the supervision of fish and game, possible economies in the development of the mineral resources, public health, and the conservation of the products of the soil. The Dominion has a vast area set aside for national parks, important among which are Rocky Mountain Park and Jasper Park in Alberta, and Yoho Park and Glacier Park in British Columbia. Over 145,000,000 acres are included in the national and provincial forest reserves.

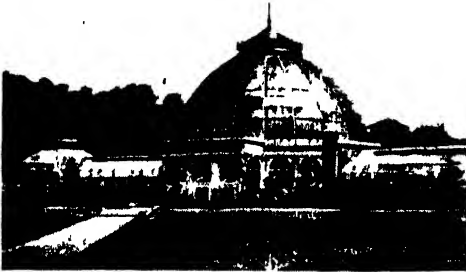
Related Subjects. The following articles in these volumes will make more clear certain phases of the general topic of conservation:

Bird	Flood
(Bird Reservations)	Forests and Forestry
Coal	Irrigation
Fire	Parks, National
(Fire Prevention)	Pinchot, Gifford

CONSERVATION OF ENERGY. See ENERGY, subhead.

CONSERVATIVE, *kon sur' va tiv*, a term applied in Great Britain and Canada to a political party which favors the maintenance of governmental conditions that have been tested and proved good. This party objects to changes in the direction of new, untried, often radical, measures. One of the greatest leaders the Conservative party ever had was the Earl of Beaconsfield. Joseph Chamberlain, one of England's ablest men, left the ranks of the Radical party and joined the Conservative side. Sir Robert Borden, a Premier of the Dominion of Canada, became a strong type of the old Conservative party, formerly known as "Tories" in England. See LIBERAL PARTY.

CONSERVATORY, *kon sur' va to rie*, a name applied to a school devoted to instruction in all branches of music. The word was originally the Italian word *conservatorio*, which means



A PLANT CONSERVATORY
Typical form of building, glass-covered.

a place for keeping anything. In the old Italian religious conservatorios, where orphan children were cared for, special attention was given to teaching music and declamation; hence its modern application. The first conservatory is said to have been founded in Naples in 1537. Perhaps the most famous school is the French *Conservatoire de Musique*, established in 1795. In England, these schools are not called conservatories, because that name is there given to places devoted exclusively to flowers; a more favored term there is Academy of Music. Every great city in America has a conservatory of music, and some of these are known throughout the continent among musicians.

In America and in England, the name is also applied to a botanical garden or to a lesser display of flowers and shrubs. See illustration.

CONSISTORY, *kon sis' toh rie*. See MASONRY, OR FREEMASONRY.

CONSOLIDATED SCHOOLS. See SCHOOL (Public Schools: Consolidated Schools).

CONSONANT, *kon' so nant*, a letter which in being uttered requires either complete stoppage or decided obstruction of the breath by the tongue, lips, and teeth. Consonants

are distinguished from vowels by the fact that vowels are open sounds, made by a modification of tone in the oral passage, and without obstruction of that passage. *Stopped* consonants are those which require a complete stoppage of the oral passage for utterance. *B, d, g, p, t,* and *k* are known as *stopped* consonants, the last three being known as *mules*, because they may be made entirely by movements of the mouth without the vocal sound. *Open* consonants are those which require only a partial stoppage of the oral passage for articulation. Two groups of consonants compose this class: *vowel-like* consonants, such as *m, n, l, r, w,* and *y;* and the *spirants*, such as *z, s, j, f,* and *v.* SEE VOWEL; ORTHOGRAPHY.

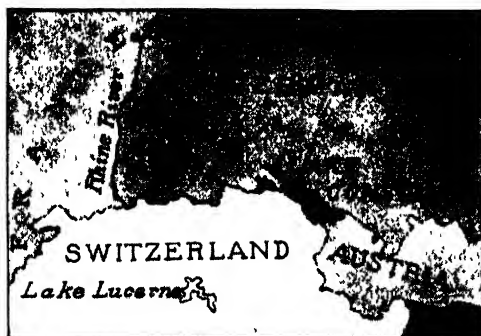
CONSORT, QUEEN. See QUEEN.

CONSPIRACY, *kon spih' a sie*, an agreement between two or more persons to carry into effect an unlawful purpose. In order to render the offense of conspiracy complete, it is not necessary that any act should really be committed following the unlawful agreement, or that any person should actually be defrauded or injured; simply the act of conspiring, or planning, constitutes the crime. Each person involved is criminally responsible for everything resulting from such purpose, whether specifically intended or not. Conspiracy is punishable with fine or imprisonment; fines may be as high as \$10,000 and punishment as great as fourteen years' imprisonment. If loss of human life results from a conspiracy, the more serious crime of murder is charged.

CONSTABLE, *kun' sta b'l*, the chief peace officer in rural communities, including unincorporated villages, which are parts of their townships. The constable not only enforces the laws and makes arrests, but he has right of search and authority to execute processes. In sparsely settled sections, he is often tax collector and overseer of roads. There is no uniformity in the duties of a constable, as the laws respecting these may vary in different jurisdictions. In colonial times, the office was of higher importance than at present. Compensation may be either in salary or in a fee for each service performed.

CONSTANCE, *kon' stans*, LAKE, also spelled KONSTANZ, is a beautiful lake in Central Europe, through which the River Rhine flows. It is situated about 1,300 feet above the sea, at the north base of the Alps, and is bounded by Switzerland, Austria, and the German states of Bavaria, Baden, and Württemberg. It is about forty miles long and nine miles wide, and is divided into two branches at its north-west extremity. The north branch is called Ueberlinger See; the south, Untersee, or Zeller See. The surrounding country is given over to agriculture, with orchards and gardens, and dotted with interesting castle ruins. A characteristic of Lake Constance which cannot be

explained is its occasional sudden rise and fall. In 1770 it rose in one hour about twenty-four feet above ordinary level.



LOCATION MAP

CONSTANTINE, a city of Algeria (which see).

CONSTANTINE, *kon' stan line*, CAIUS FLAVIUS VALERIUS CONSTANTINUS (274-337), a Roman emperor called **THE GREAT**. In his reign, Christianity was adopted as the religion of the empire, and the capital was removed from Rome to Byzantium; this latter city was renamed Constantinople, in his honor. He was the son of Emperor Constantine Chlorus, after whose death in 306 he was chosen emperor of the West. In 325 he became sole head of the Roman Empire. Indulgent with his subjects, he attained great popularity, and his administration was marked by a wise spirit of reform. He died in 337 near Nicomedia, and the empire was divided among his three sons, Constantine, Constantius, and Constans. This act was considered a grave political error, for it made three weak governments out of one of growing strength.



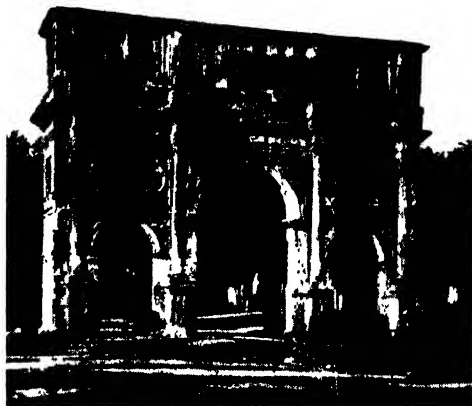
Photo Visual Education Service

CONSTANTINE AND HIS MOTHER

From a painting by Cima, in the Academy in Venice.

Arch of Constantine, a famous triumphal arch erected in Rome in 315 in memory of the victory of Constantine the Great over Maxentius, another Roman emperor. To-day it is the best preserved of ancient Roman monuments. The finest parts were either taken or copied from the Arch of Trajan, however, and hence do not properly represent the victories of Constantine.

CONSTANTINE I (1868-1923), king of Greece, the son and successor of George I, who was assassinated at Saloniki, in 1913, to-



ARCH OF CONSTANTINE

ward the close of the Balkan struggle which began in 1912. Constantine was born at Athens, was brought up in the Orthodox Greek faith, and was educated at Berlin and Leipzig. He was given a thorough military training, and commanded the Greek forces against Turkey in the unhappy war of 1897. His failure in that struggle made him extremely unpopular, but he more than redeemed his reputation by his brilliant service in the Balkan Wars, while crown prince, especially by his capture of Saloniki and Janina from the Turks. He came to the throne a national hero, and as a result of the treaties of London (May 20, 1913) and of Bucharest (August 10, 1913), ruled over territory twice as great as that which his father had governed (see **BALKAN WARS**).

At the beginning of the World War in 1914, King Constantine was confronted by peculiarly difficult problems. Greek independence was originally won by the aid of Great Britain and the allied powers, and there was a strong feeling among the Greeks that their country should join them. King Constantine, on the contrary, was said to be strongly pro-German, though he himself insisted that he was neutral. His sympathies were doubtless influenced by his own education in Germany



Photo U & U

CONSTANTINE I

His endeavor to remain neutral in the World War gave rise to many painful experiences.

and by his wife, Queen Sophia, a sister of the German Emperor, William II. It is interesting to note, however, that Constantine was related by blood to the royal families of Russia and Great Britain. His father, King George I, was a brother of Queen Alexandra, the wife of King Edward VII and mother of King George V of Great Britain. Another sister of King George of Greece was Princess Dagmar, who married Czar Alexander III and became the mother of Czar Nicholas II. Constantine's mother, also a Russian, was a first cousin of Czar Alexander III.

Allied pressure upon Greece drove him from the throne June 12, 1917, and he took refuge in Switzerland. The allies were determined that Constantine, though in neutral guise, should not lend moral or material assistance to Germany. He was restored in 1920, exiled again in 1922, after the unhappy experience of Greece in the Turkish campaign in Asia Minor, and died an exile in Sicily. See GREECE (History); VENIZELOS, ELEUTHERIOS.

CONSTANTINE III, the last of the Byzantine emperors, killed in the defense of Constantinople, in 1453. See BYZANTINE EMPIRE.

STORY of CONSTANTINOPLE



CONSTANTINOPLE, *kon stan ti no' p'l*, renamed ISTAMBUL in 1920 by the Turkish government, after bearing the older name for 1,600 years. This largest city and former capital of Turkey is one of the oldest cities in the world. Admirably situated for defense and for commercial glory, it crowns a promontory on the frontier of Europe, at the southern end of the long, narrow Bosphorus, which joins the Black Sea and the Sea of Marmora. Turkey in Asia and Turkey in Europe are separated by this strait. Small wonder that the city was coveted for centuries by the nations of Europe or that Turkey has persistently fought to retain possession of it.

Leading from the Sea of Marmora to the Aegean Sea is the narrow historic channel known as the Dardanelles. To protect their city from capture—for they knew that a hostile fleet might some day attempt to force a passage of the channel—the Turks erected a series of forts along both shores. The memorable campaign in the Dardanelles, which lasted nearly a year, ended late in 1915 with the Turks in continued possession of their ancient city, and Constantinople had revealed once more the strategic importance of its site.

Centuries ago, the commercial and defensive advantages of the city on the Bosphorus made so strong an appeal to the Roman emperor Constantine the Great, that in A.D. 330 he chose it



CONSTANTINOPLE AND VICINITY

to be the capital of his empire, changing its ancient name of *Byzantium* to Constantinople, "the city of Constantine." The present

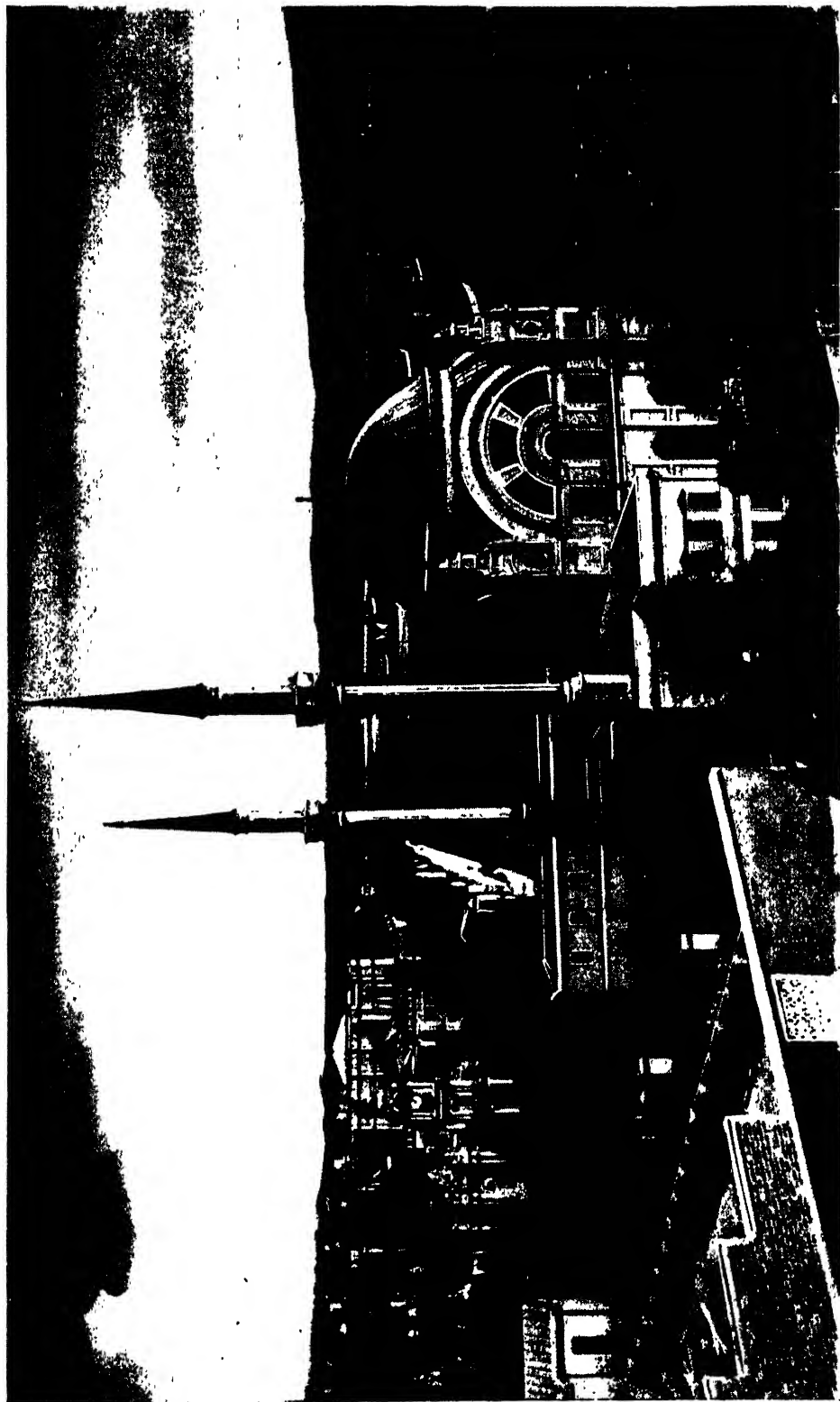


Photo © R O C

Where the Sultans Lived. The home of the rulers of Turkey under the sultanate was the series of buildings in the left center; the structure in the foreground was the private mosque of the reigning autocrats. Beside it flows the historic Bosphorus, and beyond are the hills of Turkey in Asia.



Photo. U & U

AIRPLANE VIEW OF CONSTANTINOPLE

Constantinople is a city of many cities. Stamboul, the site of the original city and the Moslem center, occupies a three-cornered section which is bounded on one side by the green Sea of Marmora, on the second by the Golden Horn, the splendid river-like harbor of the Bosphorus, and on the land side by the great fortress walls built centuries ago by the Byzantine emperors.

Of these partly ruined fortifications, the most famous is the double wall erected in 447 by Emperor Theodosius. On the opposite, or north, shore of the Golden Horn lie the suburbs of Galata and Pera, connected with Stamboul by bridges. Galata is the business part of Constantinople; Pera is the foreigners' quarter and the most modern section of the city. Across the Bosphorus, on the Asiatic shore, is the suburb of Scutari, which is governed as a part of the political district of Constantinople.

Constantinople for centuries was a backward and unsanitary city, though its many picturesque features lifted it above the commonplace. When, in 1908-1909, the revolution of the Young Turks dethroned Sultan Abdul Hamid, a new era of modernization began. A broad, granite-paved bridge replaced the ancient structure that formerly connected Stamboul and Galata, and the streets were widened and paved with granite blocks.

Not until 1913 were electric cars introduced; during the next year telephones were used for

the first time, and electric lighting superseded gas illumination. Cement fireproof buildings were erected in Stamboul to replace the old wooden structures, which many fires had defaced. An efficient fire-fighting organization was created for the first time in the city's history, and a modern sewerage system was begun. Modern automobiles and motor trucks are now regularly seen in the streets; the latter carry the loads that for centuries were packed on the backs of strong burden-bearers known as hamals.

Through all of the changes wrought by time, Constantinople has remained a city of mosques—monuments of the power of the Moslem faith. The magnificent Mosque of Saint Sophia, now Mehmedie Mosque, which was erected by Emperor Justinian in the sixth century as a Christian temple, has been the glory of Islam since the Turkish occupation of the city in 1453. The four minarets and lofty dome of the Mosque of Suleiman, an edifice built between the years 1550 and 1566, gives added distinction to this minareted city. There are also many other structures of historic interest—the Serpent Column, brought to Constantinople by Constantine from Delphi, where it had stood for eight centuries; the famous sarcophagus unearthed near Smyrna and said to have contained the body of Alexander the Great; the splendid Museum of Antiquities, in Seraglio Park; the Castle of Seven Towers, once a government house of execution; the



IN CONSTANTINOPLE GALATA BRIDGE, THE "CROSSROAD OF THE EAST"

Hippodrome, completed by Constantine and the scene of many public festivals. Not the least of the wonders of the city are the several fine aqueducts, whose underground cisterns are among the largest in the world.

Constantinople, so far, remains the educational and cultural center of Turkey. The National University, which was founded in 1900, and which is the center of new intellectual life, has opened all of its departments to women. Many new secondary and primary schools have been established. Robert College, an American institution for men, founded in 1863, and the American College for Women are missionary colleges. The Galata Serai is a famous school organized by Turkish and French cooperation. Other Turkish colleges are modeled after it.

Carpets and rugs, lambskins and wool, attar of roses, embroideries, and filigree work are exported.

The census of 1927 gave Constantinople a population of about 881,000.

Early History. In the myths of Greece, we read that the Argonauts, under the leadership of Jason, sailed up the Bosphorus. This was long before a city called Byzantium was founded on its shores by Greek adventurers, in the sixth century before Christ. In 513 B.C. the Persian monarch, Darius II, crossed the Bosphorus at the point where Robert College now stands, and for a brief period he controlled the place. After its name was changed to Constantinople, the city became the center of Greek civilization in the East, and in 395 it was made the capital of the Byzantine, or Eastern, Empire.

For over a thousand years, it was subjected to the attacks of hostile nations; three times it fell; in 1203 and 1204 to the armies of the Crusaders, and in 1453 to the conquering Turks, led by Mohammed, or Muhammad, II. That year, 1453, is one of the chief dates in European history. The capture of the city sent as fugitives to Western Europe hundreds of Greek scholars, who carried with them priceless manuscripts of the Greek classics, and in this way gave new impetus to the revival of learning. During the centuries of Turkish rule, Constantinople was an important factor in Eastern politics. For further history of Constantinople, see TURKEY.

In 1922 Angora, a city in Asia Minor, was made the capital of the new republic, and renamed Ankara. See TURKEY (Cities).

Related Subjects. The reader who is interested in the history and life of Constantinople will find the following articles helpful

Bosphorus	Golden Horn
Byzantine Empire	Jason
Constantine	Renaissance
Crusades	Turkey
Dardanelles	World War

CONSTELLATION, *kon stel a' shun*. One of the first lessons in astronomy the boy or

girl learns is to point out the shining stars that form the "Big Dipper." Then the child is led to see that the sky contains many other fascinating groups of stars, which seem to those of vivid imagination to form shapes of human beings and animals. These are the constellations, clusters of bright stars that have been given descriptive names from the earliest times. The ancient Greeks, especially, delighted to read the star-studded sky and weave fanciful tales about the constellations. The ancient names for the star groups are still used by astronomers, and those of the northern skies may be found, together with outline pictures of the constellations, in two of the illustrations under ASTRONOMY.

The "Big Dipper" forms the tail and hind-quarters of the constellation *Ursa Major* (Great Bear), and is seen only in the northern skies of the northern hemisphere. In the southern hemisphere, there are many beautiful star groups which northerners never see, unless they journey southward. Among these is the famous Southern Cross, whose four brightest stars make the outlines of a Latin Cross. F.B.L.

Related Subjects. The more important constellations will be found treated in these volumes under the following titles

Aquarius	Capricornus	Pleiades
Aries	Cassiopeia	Sagittarius
Auriga	Centaurus	Scorpio
Bear, Great	Gemini	Southern Cross
Bootes	Leo	Taurus
Cancer	Libra	Virgo
Canis Major	Orion	

See, also, ASTRONOMY (The Stars and Their Names).

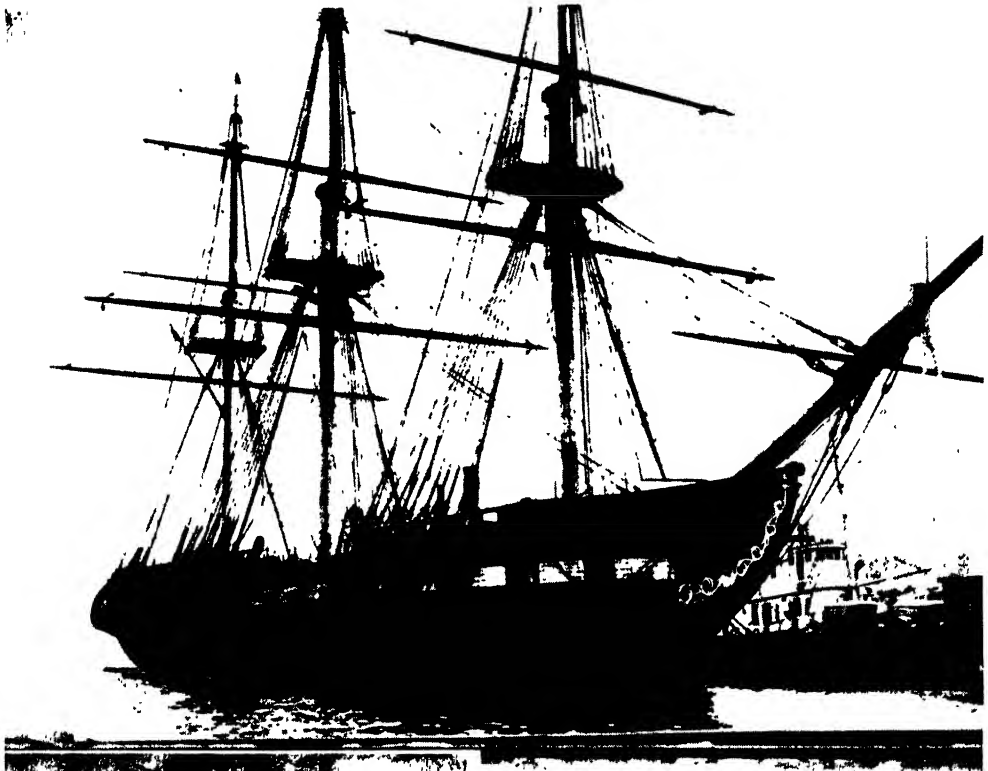
CONSTIPATION. See HEADACHE.

CONSTITUENT, *kon sti' u ent*, **ASSEMBLY.** See FRENCH REVOLUTION.

CONSTITUTION, *kon sti tu' shun*. When a debating society or a club is organized, there is adopted a set of basic principles by which all members of the society or club agree to be governed. These rules form the *constitution* of the organization; to this may be added for the conduct of members a set of rules called *by-laws*, but no by-law may declare for any principle not permitted in the constitution. A constitution is sometimes called a fundamental law, because all other laws passed by the organization must agree with the rules laid down in it.

The constitution of a nation is the body of laws which underlie the principles by which its government is guided. In most free governments, it is the supreme law of the land, and no government official or legislative body can make rules or enact laws contrary to it. The government of Great Britain is a noted exception to the above statement. There Parliament is supreme, and can enact such legislation as the times and conditions of the empire make advisable.

A constitution differs from laws enacted by legislative bodies in the following particulars:



Photos Wide World, Visual Education Service

Ay, tear her tattered ensign, down!
 Long has it waved on high,
 And many an eye has danced to see
 That banner in the sky.
 Beneath it rung the battle shout,
 And burst the cannon's roar;—
 The meteor of the ocean air
 Shall sweep the clouds no more.
 —HOLMES. *Old Ironsides*.

THE CONSTITUTION

Above, the historic vessel as it appears to-day. Below, a halftone reproduction of a painting of the ship when it was in commission more than a hundred years ago.

It is adopted by the people, in republics, or by the highest authority, in case of monarchical governments. It cannot be repealed or amended by any legislative body without the consent of the authority by which it was adopted. For these reasons, constitutions are not easily changed. See CONSTITUTION OF THE UNITED STATES; BRITISH NORTH AMERICA ACT.

CONSTITUTION, THE. This war vessel, famed in the history of the United States under the popular name of *Old Ironsides*, is now given permanent anchorage in the Boston navy yard. Launched on October 20, 1797, this splendid frigate passed unharmed through the war with

the Barbary powers, as Commander Preble's flagship. In 1812, under command of Captain Isaac Hull, the vessel fought a famous battle off Cape Race with the *Guerrière*, an English frigate, which it sank. After a number of other severe but victorious battles, in 1830 the *Constitution* was condemned as unseaworthy and was ordered to be destroyed. But the poem *Old Ironsides*, by Oliver Wendell Holmes, in which he wrote—

Oh, better that her shattered hulk
 Should sink beneath the wave,
 aroused public sentiment; the project was abandoned, and the vessel was partly rebuilt in 1833. In 1855 it was put out of commission, but in 1877 was again partially rebuilt. In 1897,

one hundred years after its launching, it was finally drydocked and repaired, to be preserved as a perpetual memorial of a proud period in history.

Thirty years later, the children of America raised a large sum of money to recondition the vessel once more, in order that it might be sailed to scores of ports in the United States and be viewed by millions of people who never have seen it, yet hold it in deep veneration. No tentative arrangements for the trip have been made. See WAR OF 1812.

CONSTITUTIONAL CONVENTION. See UNITED STATES (History: Adoption of the Constitution).

CONSTITUTIONAL LAW. See LAW.

CONSTITUTIONAL UNION PARTY, in United States history, a party formed chiefly

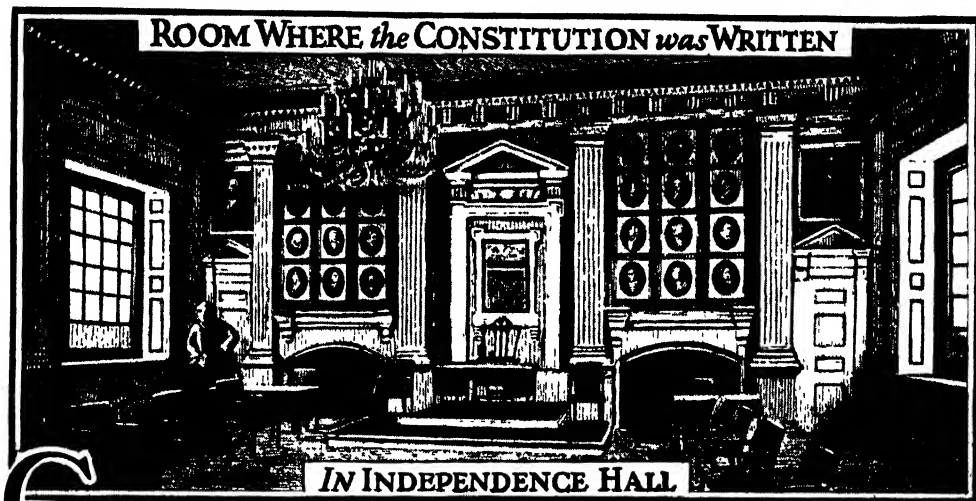
out of the remnant of the Whig party. It met in convention in Baltimore in May, 1860, and nominated John Bell of Tennessee for President and Edward Everett of Massachusetts for Vice-President, on a platform which declared only for "the Constitution of the country, the union of the states, and the enforcement of the laws." The party had only a scattering vote in the North, but in the South it carried the border states of Kentucky, Tennessee, and Virginia, and received a popular vote of about 600,000. The party virtually went out of existence at the conclusion of this campaign.

Related Subjects. The reader is referred to the following articles in these volumes

Bell, John

Political Parties

Whig



CONSTITUTION OF THE UNITED STATES, the basic, or fundamental, law of the republic. It is a precise, formal, written document of the *extraordinary*, or *supreme*, type of constitution. The founders of the Union established it as the highest governmental authority; there is no national power superior to it. Its foundations were so broadly laid as to provide for the expansion of national life and to make it an instrument which should endure for all time. To emphasize its stability, the framers made unusual and difficult the means by which it could be altered. No amendment becomes valid unless ratified by three-fourths of the states. The British system of government served, in some measure, as a pattern for it, but the wide variation required to meet the needs of a new sisterhood of states, all bound together as one federation, yet each sovereign in local affairs, developed a system of government unlike any the world had ever before seen.

Relation to State Constitutions. The Constitution binds the states of the American Union in a governmental unity in everything that affects the welfare of all, but recognizes the right of the people of each state to independence of action in what pertains solely to themselves. Therefore, the people of each state are allowed to formulate their local state constitution, but to avoid a conflict with the rights of other states or with the powers reserved to the Federal authority, the national Constitution is declared to be the supreme law of the land, "anything in the constitution or laws of any state to the contrary notwithstanding." This provision lessens the danger of a clash between Federal and state governments; for the decision in case of a conflict of laws is made a judicial, rather than a political, question. Since the Federal Constitution is the fundamental law of the land, all other laws must conform thereto; and the Constitution, like other laws, is enforceable in the courts.

The Federal judiciary has jurisdiction over all cases arising under the Federal Constitution, laws, and treaties; and therefore it has the final decision on all questions of constitutional interpretation. No other single provision of the Constitution has worked more successfully in practice, or received more praise from foreign critics.

If a law of Congress is passed which violates any provision of the national Constitution, the Supreme Court of the United States may declare it unconstitutional and void, provided the law is involved in a case before the court. In like manner, the supreme court of a state may set aside as unconstitutional any act of the state legislature which is in conflict with the state constitution.

History. Within a few months from the date the Articles of Confederation became effective (1781), serious defects were apparent in the system of government just established in the new republic. There was a necessity for changes which would create a national government with adequate powers in place of the Confederation, which was in fact only a league of sovereign states. In 1786, an effort toward regulation of interstate commerce terminated in what is known as the Annapolis Convention. It was not possible to accomplish definite results at this meeting, because only five states were represented. The debates made it plain that foreign and interstate commerce could not be regulated by a government so lacking in authority as the government of the Confederation, so Congress was asked to call a convention to provide a constitution of adequate scope. The response was prompt; Congress named Philadelphia, then the national capital, as the place of meeting, and appointed as the day the second Monday in May, 1787. The call was—

... for the sole and express purpose of revising the Articles of Confederation and reporting to Congress and the several Legislatures such alterations and provisions therein as should, when agreed to in Congress and confirmed by the States, render the Federal Constitution adequate to the exigencies of Government and the preservation of the Union.

The convention met under the presidency of George Washington; sixty-five members were appointed by the states, but only fifty-five were able to attend. The task imposed was accomplished in the brief space of four months, and the Constitution as reported to Congress was declared nearly a hundred years later by the English Premier, Gladstone, to be "the most wonderful work ever struck off at a given time by the brain and purpose of man."

Difficulties beset the members at every turn. Radical differences of opinion were held by men strong and able to maintain themselves in debate. Several important compromises were written into the document, as a result of

conflicting views; possibly because they were compromises, people have looked upon them in late years as somewhat extreme precautionary measures. The first compromise related to the Presidency. Some desired strong, centralized, individual authority; others feared it. As decided, the President was clothed with great powers, but for a short term of office, while his power to make appointments and to conclude treaties was abridged; it could be exercised only with the consent of the Senate.

The second conflict was between large and small states, the former demanding power in proportion to their voting strength, the latter naturally opposing such a plan. By agreement, the power of all states in the Senate was to be equal, but in the House of Representatives membership should be in proportion to population. The third compromise related to slavery; it was agreed that fugitive slaves should be delivered up by states to which they might flee for refuge, and that for twenty years (until 1808) no law should be passed prohibiting importation of slaves. (At the end of that period such a law was passed.) Another subject on which middle ground was taken related to the manner of choosing the President. One element contended for election by direct vote of the people; another for choice by Congress. The latter element feared the ignorance of the people; the former feared the power of a small group of men in a matter of such vast importance. Out of the disagreement came the Electoral College, the choice by the people of men called electors, who should be entrusted with the selection of the Chief Executive.

Outline of the Constitution. There are seven general divisions of the Constitution, called *articles*; each article is subdivided into sections, and each section into specific clauses. The general outline of subjects treated is as follows:

Article I Organization of Legislative Department, and powers of Congress

Article II The Executive Department, powers and duties of the President, and manner of election

Article III The organization of the Judicial Department, and the extent of its powers.

Article IV Powers granted to the states.

Article V Method of amendment

Article VI Validity of contracts prior to adoption of the Constitution, the supremacy of the Constitution, and oath or affirmation required of officials.

Article VII Ratification necessary to put the Constitution into effect.

Adoption of the Constitution. That the proceedings of the convention were not unanimous may be gathered from the fact that of fifty-five members present only thirty-nine signed the Constitution; sixteen either refused to sign or left before the instrument was fully completed. Article VII provided that the Constitution should be effective as the supreme law of the land as soon as ratified by nine states. Even-



Photo. U & U

An American Shrine. Until recently, the originals of the Declaration of Independence and the Constitution were preserved in a vault. Now they may be viewed at all times in a rich setting in the Congressional Library.

tually, the entire thirteen ratified it, in the following order, by vote of conventions held in each state for the purpose of deciding whether the state should ratify or reject:

Delaware, Dec. 7, 1787; unanimously.
 Pennsylvania, Dec. 12, 1787; vote, 46 to 23.
 New Jersey, Dec. 18, 1787; unanimously.
 Georgia, Jan. 2, 1788; unanimously
 Connecticut, Jan. 9, 1788; vote, 128 to 40
 Massachusetts, Feb. 6, 1788; vote, 187 to 168
 Maryland, April 28, 1788; vote, 63 to 12.
 South Carolina, May 23, 1788; vote, 149 to 73.
 New Hampshire, June 21, 1788; vote, 57 to 46
 Virginia, June 25, 1788; vote, 89 to 70.
 New York, July 26, 1788; vote, 30 to 28.
 North Carolina, Nov. 21, 1789; vote, 193 to 75
 Rhode Island, May 29, 1790; vote, 34 to 32.

Amendments to the Constitution. There would have been more prompt acceptance of the Constitution by the states but for a conviction that the rights of the people had not been sufficiently safeguarded. It was only on the definite understanding that the first Congress would correct the omission by proposing amendments that several states voted to ratify it. The first ten amendments were accordingly proposed in 1789 and declared adopted in 1791. These comprise a Bill of Rights, guaranteeing the liberties of the individual, as well as the rights of the states, against Federal oppression. The eleventh amendment provides in effect that a state shall not be sued in the Federal courts by citizens of another state or of a foreign country. This amendment was adopted in 1798. The twelfth amendment, changing the method of electing the President and Vice-President, was adopted in 1804. Thereafter, until the issues of the War of Secession were decided, no other amendments were proposed.

Amendments Since the War of Secession. The reconstruction amendments (the thirteenth, fourteenth, and fifteenth) were added to the Constitution in consequence of the War of Secession. The thirteenth amendment abolished slavery throughout the United States and all places subject to its jurisdiction. The fourteenth defines citizenship, and seeks to prevent the states from discriminating against certain classes of citizens. The fifteenth declares that the right of citizens of the United States to vote shall not be denied or abridged on account of race or color.

During the War of Secession, the Federal government taxed incomes, but in 1895 the power of Congress to levy a similar tax was denied by the Supreme Court. A constitutional amendment was therefore necessary, in order that Congress might exercise this power. Accordingly, the sixteenth amendment was added to the Constitution in 1913, directly authorizing Congress to tax incomes.

The seventeenth amendment (adopted in 1913) provided for election of United States

Senators by direct vote of the people. The eighteenth amendment (effective January 16, 1920) made the United States and all of its insular possessions prohibition territory. The nineteenth (effective August 26, 1920) gave suffrage to women. A proposed twentieth amendment, in 1924, authorizing Federal legislation on child labor, was not approved in the state legislatures.

Constitutional Changes through Interpretation. The Constitution has also been modified and expanded through interpretation, especially through the construction placed upon its terms by the United States Supreme Court. The importance of this tribunal in the development of the Federal Constitution can hardly be overestimated. "The Constitution speaks of the age in which it was written, more than a century ago. The court expounds it in the language of its own age, holding fast to the old words and powers, but expanding them to keep pace with the expansion of our country, our people, our enterprises, industries, and civilization."

In the interpretation and expansion of the Constitution, the doctrine of implied powers has been of the utmost importance. The Supreme Court has uniformly held that the Federal government possesses not only the powers expressly granted in the Constitution, but also those which are included within, or necessarily implied from, powers expressly granted. In other words, where it appears that a power has been granted to the Federal government, the Constitution is to be liberally construed so as to give effect to the grant. This construction is authorized by the Constitution itself, which declares that Congress shall have power to make all laws which shall be "necessary and proper" for carrying into execution the powers conferred upon the Federal government. W.B.G.

Further Constitutional Changes. That the Federal Constitution will be subject to further amendment within a decade or two is quite probable. There are many people who believe that the eighteenth amendment may be altered or stricken from the Constitution; child labor will probably be the subject of another attempt to add a new amendment. Then, too, there has long been a sentiment among the people that the President of the United States should be elected by popular vote, rather than by the cumbersome present method, through the Electoral College.

Related Subjects. Further information bearing on this topic will be found in the following articles in these volumes:

Amendment	President of the United States
Annapolis Convention	States
Articles of Confederation	Senate of the United States
Congress of the United States	States' Rights
Courts	Supreme Court
Electoral College	United States
Representatives, House of	Subtitles <i>Government and History</i>

The Constitution of the United States

[Capitalization and punctuation as in the original document. Words in bold type represent changes due to amendment.]

PREAMBLE

We, the people of the United States, in order to form a more perfect union, establish justice, insure domestic tranquillity, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution for the United States of America.

ARTICLE I

THE LEGISLATIVE DEPARTMENT

Section 1. All legislative powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and a House of Representatives

THE HOUSE OF REPRESENTATIVES

Section 2. (1) The House of Representatives shall be composed of members chosen every second year by the people of the several States, and the electors in each State shall have the qualifications requisite for electors of the most numerous branch of the State legislature

(2) No person shall be a Representative who shall not have attained to the age of twenty-five years, and been seven years a citizen of the United States, and who shall not, when elected, be an inhabitant of that State in which he shall be chosen¹

(3) Representatives and direct taxes (except income)² shall be apportioned among the several States which may be included within this Union according to their respective numbers,—**which shall be determined by adding to the whole number of free persons, including those bound to service for a term of years—**and excluding Indians not taxed—**three-fifths of all other persons.**³ The actual enumeration shall be made within three years after the first meeting of the Congress of the United States, and within every subsequent term of ten years, in such manner as they shall by law direct. The number of Representatives shall not exceed one for every thirty thousand, but each State shall have at least one Representative; **and until such enumeration shall be made, the State of New Hampshire shall be entitled to choose 3; Massachusetts, 8; Rhode Island and Providence Plantations, 1; Connecticut, 5; New York, 6; New Jersey, 4; Pennsylvania, 8; Delaware, 1; Maryland, 6; Virginia, 10; North Carolina, 5; South Carolina, 5; and Georgia, 3.**⁴

(4) When vacancies happen in the representation from any State, the Executive Au-

thority thereof shall issue writs of election to fill such vacancies.

(5) The House of Representatives shall choose their Speaker and other officers, and shall have the sole power of impeachment.

THE UNITED STATES SENATE

Section 3. (1) The Senate of the United States shall be composed of two Senators from each State, chosen by the—**Legislature**⁵—thereof, for six years; and each Senator shall have one vote.

(2) Immediately after they shall be assembled in consequence of the first election, they shall be divided as equally as may be into three classes. The seats of the Senators of the first class shall be vacated at the expiration of the second year, of the second class at the expiration of the fourth year, and of the third class at the expiration of the sixth year, so that one-third may be chosen every second year,—**and if vacancies happen by resignation, or otherwise, during the recess of the legislature of any State, the Executive thereof may make temporary appointments until the next meeting of the legislature, which shall then fill such vacancies.**⁶

(3) No person shall be a Senator who shall not have attained to the age of thirty years, and been nine years a citizen of the United States, and who shall not, when elected, be an inhabitant of that State for which he shall be chosen⁷

(4) The Vice-President of the United States shall be President of the Senate, but shall have no vote unless they be equally divided

(5) The Senate shall choose their other officers, and also a President pro tempore in the absence of the Vice-President, or when he shall exercise the office of President of the United States

(6) The Senate shall have the sole power to try all impeachments. When sitting for that purpose, they shall be on oath or affirmation. When the President of the United States is tried, the Chief Justice shall preside; and no person shall be convicted without the concurrence of two-thirds of the members present

(7) Judgment in cases of impeachment shall not extend further than to removal from office and disqualification to hold and enjoy any office of honor, trust, or profit under the United States; but the party convicted shall nevertheless be liable and subject to indictment, trial, judgment, and punishment, according to law.

¹ See Amendment XIV, Section 3.

² Insert See Amendment XVI.

³ See Amendment XIII and Sections 1 and 2 of Amendment XIV

⁴ Obsolete since 1793

⁵ See Amendment XVII, Paragraph 1.

⁶ See Amendment XVII, Paragraph 2.

⁷ See Amendment XIV, Section 3

ORGANIZATION OF CONGRESS

Section 4. (1) The times, places, and manner of holding elections for Senators and Representatives shall be prescribed in each State by the Legislature thereof; but the Congress may at any time by law make or alter such regulations,—except as to the places of choosing Senators.⁸

(2) The Congress shall assemble at least once in every year, and such meeting shall be on the first Monday in December, unless they shall by law appoint a different day

Section 5. (1) Each house shall be the judge of the elections, returns, and qualifications of its own members, and a majority of each shall constitute a quorum to do business; but a smaller number may adjourn from day to day, and may be authorized to compel the attendance of absent members in such manner and under such penalties as each house may provide

(2) Each house may determine the rules of its proceedings, punish its members for disorderly behavior, and with the concurrence of two-thirds expel a member

(3) Each house shall keep a journal of its proceedings, and from time to time publish the same, excepting such parts as may in their judgment require secrecy, and the yeas and nays of the members of either house on any question shall, at the desire of one-fifth of those present, be entered on the journal.

(4) Neither house, during the session of Congress, shall, without the consent of the other, adjourn for more than three days, nor to any other place than that in which the two houses shall be sitting

Section 6. (1) The Senators and Representatives shall receive a compensation for their services, to be ascertained by law, and paid out of the Treasury of the United States. They shall in all cases, except treason, felony, and breach of the peace, be privileged from arrest during their attendance at the session of their respective houses, and in going to and returning from the same; and for any speech or debate in either house they shall not be questioned in any other place

(2) No Senator or Representative shall, during the time for which he was elected, be appointed to any civil office under the authority of the United States which shall have been created, or the emoluments whereof shall have been increased during such time; and no person holding any office under the United States shall be a member of either house during his continuance in office.

Section 7. (1) All bills for raising revenue shall originate in the House of Representatives, but the Senate may propose or concur with amendments, as on other bills

(2) Every bill which shall have passed the House of Representatives and the Senate shall, before it becomes a law, be presented to the President of the United States; if he approve, he shall sign it, but if not, he shall return it, with his objections, to that house in which it shall have originated, who shall enter the objections at large on their journal, and proceed to reconsider it. If after such reconsideration two-thirds of that house shall agree to pass the bill, it shall be sent, together with the objections, to the other house, by which it shall likewise be reconsidered, and if approved by two-thirds of that house it shall become a law. But in all such cases the votes of both houses shall be determined by yeas and nays, and the names of the persons voting for and against the bill shall be entered on the journal of each house respectively. If any bill shall not be returned by the President within ten days (Sundays excepted) after it shall have been presented to him, the same shall be a law in like manner as if he had signed it, unless the Congress by their adjournment prevent its return, in which case it shall not be a law

(3) Every order, resolution, or vote to which the concurrence of the Senate and House of Representatives may be necessary (except on a question of adjournment) shall be presented to the President of the United States; and before the same shall take effect shall be approved by him, or being disapproved by him, shall be repassed by two-thirds of the Senate and House of Representatives, according to the rules and limitations prescribed in the case of a bill

POWERS VESTED IN CONGRESS

Section 8. The Congress shall have power:

(1) To lay and collect taxes, duties, imposts, and excises, to pay the debts and provide for the common defense and general welfare of the United States; but all duties, imposts, and excises shall be uniform throughout the United States

(2) To borrow money on the credit of the United States

(3) To regulate commerce with foreign nations, and among the several States, and with the Indian tribes.

(4) To establish a uniform rule of naturalization and uniform laws on the subject of bankruptcies throughout the United States.

(5) To coin money, regulate the value thereof, and of foreign coin, and fix the standard of weights and measures.

(6) To provide for the punishment of counterfeiting the securities and current coin of the United States

(7) To establish post-offices and post-roads

(8) To promote the progress of science and useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries

⁸ See Amendment XVII.

(9) To constitute tribunals inferior to the Supreme Court.

(10) To define and punish piracies and felonies committed on the high seas, and offenses against the law of nations

(11) To declare war, grant letters of marque and reprisal, and make rules concerning captures on land and water

(12) To raise and support armies, but no appropriation of money to that use shall be for a longer term than two years

(13) To provide and maintain a navy

(14) To make rules for the government and regulation of the land and naval forces

(15) To provide for calling forth the militia to execute the laws of the Union, suppress insurrections, and repel invasions

(16) To provide for organizing, arming, and disciplining the militia, and for governing such part of them as may be employed in the service of the United States, reserving to the States respectively the appointment of the officers, and the authority of training the militia according to the discipline prescribed by Congress

(17) To exercise exclusive legislation in all cases whatsoever over such district (not exceeding ten miles square) as may, by cession of particular States and the acceptance of Congress, become the seat of the Government of the United States, and to exercise like authority over all places purchased by the consent of the legislature of the State in which the same shall be, for the erection of forts, magazines, arsenals, dock-yards, and other needful buildings; And

(18) To make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this Constitution in the Government of the United States, or in any department or officer thereof

RESTRAINTS, FEDERAL AND STATE

Section 9. [(1) **The migration or importation of such persons as any of the States now existing shall think proper to admit shall not be prohibited by the Congress prior to the year one thousand eight hundred and eight, but a tax or duty may be imposed on such importation, not exceeding ten dollars for each person.**⁹

(2) The privilege of the writ of habeas corpus shall not be suspended, unless when in cases of rebellion or invasion the public safety may require it

(3) No bill of attainder or ex post facto law shall be passed

(4) No capitation or other direct tax (**except income**)¹⁰ shall be laid, unless in propor-

tion to the census or enumeration hereinbefore directed to be taken.

(5) No tax or duty shall be laid on articles exported from any State

(6) No preference shall be given by any regulation of commerce or revenue to the ports of one State over those of another, nor shall vessels bound to or from one State be obliged to enter, clear, or pay duties in another.

(7) No money shall be drawn from the Treasury but in consequence of appropriations made by law; and a regular statement and account of the receipts and expenditures of all public money shall be published from time to time.

(8) No title of nobility shall be granted by the United States. And no person holding any office of profit or trust under them shall, without the consent of the Congress, accept of any present, emolument, office, or title of any kind whatever from any king, prince, or foreign state

Section 10. (1) No State shall enter into any treaty, alliance or confederation, grant letters of marque and reprisal, coin money, emit bills of credit, make anything but gold and silver coin a tender in payment of debts, pass any bill of attainder, ex post facto law, or law impairing the obligation of contracts, or grant any title of nobility

(2) No State shall, without the consent of the Congress, lay any imposts or duties on imports or exports, except what may be absolutely necessary for executing its inspection laws, and the net produce of all duties and imposts, laid by any State on imports or exports, shall be for the use of the Treasury of the United States; and all such laws shall be subject to the revision and control of the Congress

(3) No State shall, without the consent of Congress, lay any duty of tonnage, keep troops or ships of war in time of peace, enter into any agreement or compact with another State, or with a foreign power, or engage in war, unless actually invaded or in such imminent danger as will not admit of delay.

ARTICLE II

THE EXECUTIVE DEPARTMENT

Section 1. (1) The executive power shall be vested in a President of the United States of America. He shall hold his office during the term of four years, and, together with the Vice-President, chosen for the same term, be elected as follows:

(2) Each State shall appoint, in such manner as the Legislature thereof may direct, a number of electors, equal to the whole number of Senators and Representatives to which the State may be entitled in the Congress; but no Senator or Representative, or person holding

⁹ Obsolete since 1808 (slavery section).

¹⁰ Insert See Amendment XVI

an office of trust or profit under the United States, shall be appointed an elector.¹¹

(3) The electors shall meet in their respective States and vote by ballot for two persons, of whom one at least shall not be an inhabitant of the same State with themselves. And they shall make a list of all the persons voted for, and of the number of votes for each; which list they shall sign and certify, and transmit sealed to the seat of the government of the United States, directed to the President of the Senate. The President of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates, and the votes shall then be counted. The person having the greatest number of votes shall be the President, if such number be a majority of the whole number of electors appointed; and if there be more than one who have such majority, and have an equal number of votes, then the House of Representatives shall immediately choose by ballot one of them for President; and if no person have a majority, then from the five highest on the list the said House shall, in like manner, choose the President. But in choosing the President the votes shall be taken by States, the representation from each State having one vote; a quorum for this purpose shall consist of a member or members from two-thirds of the States, and a majority of all the States shall be necessary to a choice. In every case, after the choice of the President, the person having the greatest number of votes of the electors shall be the Vice-President. But if there should remain two or more who have equal votes, the Senate shall choose from them by ballot the Vice-President.¹²

(4) The Congress may determine the time of choosing the electors, and the day on which they shall give their votes, which day shall be the same throughout the United States.

(5) No person except a natural born citizen [or a citizen of the United States at the time of the adoption of this Constitution]¹³ shall be eligible to the office of President; neither shall any person be eligible to that office who shall not have attained to the age of thirty-five years and been fourteen years a resident within the United States.¹⁴

(6) In case of the removal of the President from office, or of his death, resignation, or inability to discharge the powers and duties of the said office, the same shall devolve on the Vice-President, and the Congress may by law provide for the case of removal, death, resignation, or inability, both of the President and Vice-President, declaring what officer shall then act as President, and such officer shall act accordingly until the disability be removed or a President shall be elected

(7) The President shall, at stated times, receive for his services a compensation which shall neither be increased nor diminished during the period for which he shall have been elected, and he shall not receive within that period any other emolument from the United States or any of them

(8) Before he enters on the execution of his office, he shall take the following oath or affirmation:

"I do solemnly swear (or affirm) that I will faithfully execute the office of President of the United States, and will, to the best of my ability, preserve, protect, and defend the Constitution of the United States."

Section 2. (1) The President shall be commander-in-chief of the army and navy of the United States, and of the militia of the several States, when called into the actual service of the United States, he may require the opinion, in writing, of the principal officer in each of the executive departments, upon any subject relating to the duties of their respective offices, and he shall have power to grant reprieves and pardons for offenses against the United States, except in cases of impeachment.

(2) He shall have power, by and with the advice and consent of the Senate, to make treaties, provided two-thirds of the Senators present concur, and he shall nominate, and by and with the advice and consent of the Senate shall appoint ambassadors, other public ministers and consuls, judges of the Supreme Court, and all other officers of the United States whose appointments are not herein otherwise provided for, and which shall be established by law; but the Congress may by law vest the appointment of such inferior officers as they think proper in the President alone, in the courts of law, or in the heads of departments

(3) The President shall have power to fill up all vacancies that may happen during the recess of the Senate, by granting commissions which will expire at the end of their next session

Section 3. He shall from time to time give to the Congress information of the state of the Union, and recommend to their consideration such measures as he shall judge necessary and expedient; he may, on extraordinary occasions, convene both houses, or either of them, and in case of disagreement between them, with respect to the time of adjournment, he may adjourn them to such time as he shall think proper; he shall receive ambassadors and other public ministers, he shall take care that the laws be faithfully executed, and shall commission all the officers of the United States

Section 4. The President, Vice-President, and all civil officers of the United States, shall be removed from office on impeachment for, and conviction of, treason, bribery, or other high crimes and misdemeanors.

¹¹ See Amendment XIV, Section 3.

¹² Supplanted by Amendment XII.

¹³ Obsolete.

ARTICLE III

THE JUDICIAL DEPARTMENT

Section 1. The judicial power of the United States shall be vested in one Supreme Court, and in such inferior courts as the Congress may from time to time ordain and establish. The judges, both of the Supreme and inferior courts, shall hold their offices during good behavior and shall, at stated times, receive for their services a compensation which shall not be diminished during their continuance in office

Section 2. (1) The judicial power shall extend to all cases, in law and equity, arising under this Constitution, the laws of the United States, and treaties made, or which shall be made, under their authority; to all cases affecting ambassadors, other public ministers, and consuls, to all cases of admiralty and maritime jurisdiction, to controversies to which the United States shall be a party, to controversies between two or more States;—**between a State and citizens of another State;**¹⁵—between citizens of different States; between citizens of the same State claiming lands under grants of different States, and between a State, or the citizens thereof, and foreign states,—**citizens or subjects.**¹⁶

(2) In all cases affecting ambassadors, other public ministers, and consuls, and those in which a State shall be party, the Supreme Court shall have original jurisdiction. In all the other cases before mentioned, the Supreme Court shall have appellate jurisdiction, both as to law and fact, with such exceptions and under such regulations as the Congress shall make

(3) The trial of all crimes, except in cases of impeachment, shall be by jury; and such trial shall be held in the State where the said crimes shall have been committed, but when not committed within any State, the trial shall be at such place or places as the Congress may by law have directed.

Section 3. (1) Treason against the United States shall consist only in levying war against them, or in adhering to their enemies, giving them aid and comfort. No person shall be convicted of treason unless, on the testimony of two witnesses to the same overt act, or on confession in open court

(2) The Congress shall have power to declare the punishment of treason, but no attainder of treason shall work corruption of blood, or forfeiture, except during the life of the person attainted

ARTICLE IV

RELATION OF THE STATES TO EACH OTHER

Section 1. Full faith and credit shall be given in each State to the public acts, records,

and judicial proceedings of every other State. And the Congress may by general laws prescribe the manner in which such acts, records, and proceedings shall be proved, and the effect thereof.

Section 2. (1) The citizens of each State shall be entitled to all privileges and immunities of citizens in the several States

(2) A person charged in any State with treason, felony, or other crime, who shall flee from justice, and be found in another State, shall, on demand of the Executive authority of the State from which he fled, be delivered up, to be removed to the State having jurisdiction of the crime.

(3) **[No person held to service or labor in one State, under the laws thereof, escaping into another, shall, in consequence of any law or regulation therein, be discharged from such service or labor, but shall be delivered up on claim of the party to whom such service or labor may be due.]**¹⁶

RELATION OF THE UNITED STATES TO STATES AND TERRITORIES

Section 3. (1) New States may be admitted by the Congress into this Union, but no new State shall be formed or erected within the jurisdiction of any other State, nor any State be formed by the junction of two or more States, or parts of States, without the consent of the Legislatures of the States concerned, as well as of the Congress

(2) The Congress shall have power to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States; and nothing in this Constitution shall be so construed as to prejudice any claims of the United States, or of any particular State

Section 4. The United States shall guarantee to every State in this Union a republican form of government, and shall protect each of them against invasion, and, on application of the Legislature, or of the Executive (when the Legislature cannot be convened), against domestic violence

ARTICLE V

PROVISION FOR AMENDING THE CONSTITUTION

The Congress, whenever two-thirds of both houses shall deem it necessary, shall propose amendments to this Constitution, or, on the application of the Legislatures of two-thirds of the several States, shall call a convention for proposing amendments, which in either case, shall be valid to all intents and purposes, as part of this Constitution, when ratified by the Legislatures of three-fourths of the several States, or by conventions in three-fourths thereof, as the one or the other mode of ratification may be proposed by the Congress;

¹⁵ See Amendment XI.

¹⁶ Obsolete.

provided [that no amendment which may be made prior to the year one thousand eight hundred and eight shall in any manner affect the first and fourth clauses in the Ninth Section of the First Article; and]¹⁷ that no State, without its consent, shall be deprived of its equal suffrage in the Senate.

ARTICLE VI

NATIONAL DEBTS

(1) All debts contracted and engagements entered into before the adoption of this Constitution shall be as valid against the United States under this Constitution as under the Confederation.

SUPREMACY OF THE NATIONAL GOVERNMENT

(2) This Constitution and the laws of the United States which shall be made in pursuance thereof and all treaties made, or which shall be made, under the authority of the United States, shall be the supreme law of the land, and the judges in every State shall be bound thereby, anything in the Constitution or laws of any State to the contrary notwithstanding

PLEDGE—NO RELIGIOUS TEST

(3) The Senators and Representatives before mentioned, and the members of the several State Legislatures, and all executive and judicial officers, both of the United States and of the several States, shall be bound by oath or affirmation to support this Constitution; but no religious test shall ever be required as a qualification to any office or public trust under the United States.

ARTICLE VII

The ratification of the conventions of nine States shall be sufficient for the establishment of this Constitution between the States so ratifying the same

Done in Convention by the unanimous consent of the States present the seventeenth day of September in the year of our Lord one thousand seven hundred and eighty-seven and of the independence of the United States of America the twelfth. In witness whereof we have hereunto subscribed our names,

George Washington, President
and delegate from Virginia

NEW HAMPSHIRE

John Langdon
Nicholas Gilman

MASSACHUSETTS

Nathaniel Gorham
Rufus King

CONNECTICUT

William Samuel Johnson
Roger Sherman

NEW YORK

Alexander Hamilton

NEW JERSEY

William Livingston
David Brearley
William Paterson
Jonathan Dayton

¹⁷ Obsolete.

PENNSYLVANIA

Benjamin Franklin
Thomas Mifflin
Robert Morris
George Clymer
Thomas Fitzsimmons
Jared Ingersoll
James Wilson
Gouverneur Morris

DELAWARE

George Read
Gunning Bedford
John Dickinson
Richard Bassett
Jacob Broom

MARYLAND

James McHenry
Daniel of St. Thomas Jenifer
Daniel Carroll

VIRGINIA

John Blair
James Madison

NORTH CAROLINA

William Blount
Richard Dobbs Spaight
Hugh Williamson

SOUTH CAROLINA

John Rutledge
Charles Cotesworth Pinckney
Charles Pinckney
Pierce Butler

GEORGIA

William Few
Abraham Baldwin

[Delegates Edmund Randolph and George Mason of Virginia and Elbridge Gerry of Massachusetts were present on the last day of the Convention, but refused to sign the Constitution]

[The following delegates were not present on the last day of the Convention, but a goodly portion of them were in favor of the Constitution: W. Oliver Ellsworth of Connecticut; William Churchill Houston of New Jersey; John Caleb Strong of Massachusetts; William Pierce and William Houston of Georgia; William Richardson Davie and Alexander Martin of North Carolina; James McClurg and George Wythe of Virginia; Robert Yates and W. John Lansing of New York; and John Francis Mercer and Luther Martin of Maryland.]

[Many people seem to have the impression that John Hancock, John Adams, Thomas Jefferson, and Patrick Henry were delegates to the Constitutional Convention, but none of them was]

Amendments

(The first ten, proposed September 25, 1789; adopted June 15, 1790.)

Article I

Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof, or abridging the freedom of speech, or of the press, or the right of the people peaceably to assemble, and to petition the government for a redress of grievances

Article II

A well-regulated militia being necessary to the security of a free State, the right of the

people to keep and bear arms shall not be infringed

Article III

No soldier shall, in time of peace, be quartered in any house without the consent of the owner; nor in time of war but in a manner to be prescribed by law.

Article IV

The right of the people to be secure in their persons, houses, papers and effects, against unreasonable searches and seizures, shall not be violated, and no warrants shall issue but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

Article V

No person shall be held to answer for a capital or otherwise infamous crime, unless on a presentment or indictment of a grand jury, except in cases arising in the land or naval forces, or in the militia, when in actual service in time of war or public danger; nor shall any person be subject for the same offense to be twice put in jeopardy of life or limb, nor shall be compelled in any criminal case to be a witness against himself, nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation

Article VI

In all criminal prosecutions the accused shall enjoy the right to a speedy and public trial, by an impartial jury of the State and district wherein the crime shall have been committed, which district shall have been previously ascertained by law, and to be informed of the nature and cause of the accusation, to be confronted with the witnesses against him, to have compulsory process for obtaining witnesses in his favor, and to have the assistance of counsel for his defense

Article VII

In suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury shall be otherwise re-examined in any court of the United States than according to the rules of the common law

Article VIII

Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted

Article IX

The enumeration in the Constitution of certain rights shall not be construed to deny or disparage others retained by the people

Article X

The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people

Article XI

(Proposed September 5, 1794; adopted January 8, 1798.)

The judicial power of the United States shall not be construed to extend to any suit in law or equity, commenced or prosecuted against one of the United States by citizens of another State, or by citizens or subjects of any foreign state.

(This amendment modifies Paragraph 1, Section 2, of Article III.)

Article XII

(Proposed December 12, 1803, adopted September 25, 1804.)

The electors shall meet in their respective States, and vote by ballot for President and Vice-President, one of whom at least shall not be an inhabitant of the same State with themselves; they shall name in their ballots the person voted for as President, and in distinct ballots the person voted for as Vice-President; and they shall make distinct lists of all persons voted for as President, and of all persons voted for as Vice-President, and of the number of votes for each, which list they shall sign and certify, and transmit, sealed, to the seat of the Government of the United States, directed to the President of the Senate; the President of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates, and the votes shall then be counted, the person having the greatest number of votes for President shall be the President, if such number be a majority of the whole number of electors appointed; and if no person have such majority, then from the persons having the highest numbers, not exceeding three, on the list of those voted for as President, the House of Representatives shall choose immediately, by ballot, the President. But in choosing the President, the votes shall be taken by States, the representation from each State having one vote, a quorum for this purpose shall consist of a member or members from two-thirds of the States, and a majority of all the States shall be necessary to a choice. And if the House of Representatives shall not choose a President, whenever the right of choice shall devolve upon them, before the fourth day of March next following, then the Vice-President shall act as President, as in the case of the death or other constitutional disability of the President. The person having the greatest number of votes as Vice-President shall be the Vice-President if such number be a majority of the whole number of electors appointed, and if no person have a majority, then from the two highest numbers on the list the Senate shall choose the Vice-President; a quorum for the purpose shall consist of two-thirds of the whole number of Senators, and a majority of the whole number shall be neces-

sary to a choice. But no person constitutionally ineligible to the office of President shall be eligible to that of Vice-President of the United States

(This amendment supplants Paragraph 3, Section 1, of Article II.)

Article XIII

(Proposed February 1, 1865; adopted December 18, 1865.)

Section 1. Neither slavery nor involuntary servitude, except as a punishment for crime, whereof the party shall have been duly convicted, shall exist within the United States, or any place subject to their jurisdiction

Section 2. Congress shall have power to enforce this article by appropriate legislation.

Article XIV

(Proposed June 16, 1866; adopted July 21, 1868.)

Section 1. All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States, nor shall any State deprive any person of life, liberty, or property, without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws.

Section 2. Representatives shall be apportioned among the several States according to their respective numbers, counting the whole number of persons in each State, excluding Indians not taxed. But when the right to vote at any election for the choice of electors for President and Vice-President of the United States, Representatives in Congress, the executive and judicial officers of a State, or the members of the Legislature thereof, is denied to any of the male inhabitants of such State, being twenty-one years of age and citizens of the United States, or in any way abridged, except for participation in rebellion, or other crime, the basis of representation therein shall be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such State

(Sections 1 and 2 of this amendment modify Paragraph 3, Section 2, of Article I)

Section 3. No person shall be a Senator, or Representative in Congress, or elector of President and Vice-President, or hold any office, civil or military, under the United States, or under any State, who, having previously taken an oath as a member of Congress, or as an officer of the United States, or as a member of any State legislature, or as an executive or judicial officer of any State, to support the Constitution of the United States, shall have engaged in insurrection or rebellion against

the same, or given aid or comfort to the enemies thereof. But Congress may, by a vote of two-thirds of each house, remove such disability.

(Section 3 of this amendment supplements Paragraph 2, Section 2, of Article I; Paragraph 3, Section 3, of Article I; Paragraph 2, Section 1, of Article II; and Paragraph 5, Section 1, of Article II)

Section 4. The validity of the public debt of the United States, authorized by law, including debts incurred for payment of pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned. But neither the United States nor any State shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave; but all such debts, obligations and claims shall be held illegal and void

Section 5. The Congress shall have power to enforce, by appropriate legislation, the provisions of this article

Article XV

(Proposed February 27, 1869; adopted March 30, 1870)

Section 1. The right of citizens of the United States to vote shall not be denied or abridged by the United States, or by any State, on account of race, color, or previous condition of servitude

Section 2. The Congress shall have power to enforce this article by appropriate legislation

(This amendment supplements Paragraph 1, Section 2, of Article I)

Article XVI

(Proposed July 31, 1909; adopted February 25, 1913.)

The Congress shall have power to lay and collect taxes on incomes, from whatever source derived, without apportionment among the several States, and without regard to any census or enumeration

(This amendment modifies Paragraph 3, Section 2, of Article I and Paragraph 4, Section 9, of Article I)

Article XVII

(Proposed May 15, 1912; adopted May 31, 1913)

(1) The Senate of the United States shall be composed of two Senators from each State, elected by the people thereof, for six years; and each Senator shall have one vote. The electors in each State shall have the qualifications requisite for electors of the most numerous branch of the State legislature

(Paragraph 1 of this amendment modifies Paragraph 1, Section 3, of Article I and Paragraph 1, Section 4, of Article I)

(2) When vacancies happen in the representation of any State in the Senate, the executive authority of such State shall issue writs of election to fill such vacancies: Provided, That the legislature of any State may empower the executive thereof to make temporary appointments until the people fill the vacancies by election as the legislature may direct

(Paragraph 2 of this amendment modifies Paragraph 2, Section 3, of Article I)

(3) This amendment shall not be so construed as to affect the election or term of any Senator chosen before it becomes valid as part of the Constitution

Article XVIII

(Proposed December 19, 1917; adopted January 20, 1919)

Section 1. After one year from the ratification of this article the manufacture, sale, or transportation of intoxicating liquors within, the importation thereof into, or the exportation thereof from the United States and all territory subject to the jurisdiction thereof for beverage purposes is hereby prohibited

Section 2. The Congress and the several States shall have concurrent power to enforce this article by appropriate legislation.

Section 3. This article shall be inoperative unless it shall have been ratified as an amendment to the Constitution by the legislatures of the several States, as provided in the Constitution, within seven years from the date of the submission hereof to the States by the Congress

Article XIX

(Proposed June 5, 1919, adopted August 26, 1920.)

The right of citizens of the United States to vote shall not be denied or abridged by the United States or by any State on account of sex.

Congress shall have power to enforce this article by appropriate legislation

(This amendment supplements Paragraph 1, Section 2, of Article I)

[The nineteenth was the last amendment adopted]

CONSTITUTION STATE, one of the three popular names of Connecticut. See **CONNECTICUT** (History).

CONSUL, *kon' sul*, an official appointed by the government of one country to attend to its commercial interests in a city of another country. A consul differs from a diplomatic representative in that the former attends only to business matters, while the latter is interested only in the political relations between his country and the one to which he is appointed. Among the responsibilities resting upon the United States consuls are the issuing of certificates of births, deaths, and marriages of Americans temporarily within their jurisdiction, regulation of shipping, caring for disabled seamen, and the insuring of justice to native-born or naturalized American citizens who are traveling abroad. Consuls send to the home government reports concerning foreign trade conditions; this is one of the means by which they may be very helpful, for they can broaden the markets to home merchants. They give certification of invoices of merchandise valued at more than \$100, which is exported; this duty is highly important for the protection of the customs revenue, as it is an effective check on smuggling.

The consular service of any leading country is divided into three ranks, *consuls-general*, *consuls*, and *commercial agents*, the first named having charge of all consuls in a certain district; the last named, though they have the same duties and powers as consuls, are not

officially recognized by the governments to which they are sent. In countries where the government is unstable, American consuls are invested with exceptional powers, and such powers and duties may be determined by treaty. Until recently, consular appointments by the United States have been governed wholly by politics. The folly of political recommendation alone has long been realized, and consuls will soon be chosen for fitness and by competitive examinations. It is intended that any young man may in the future aspire to the consular service with expectation of a life occupation.

The Roman Consul. The title consul was bestowed on the two highest magistrates in the Roman Republic. These officials were first chosen in 509 B.C., the year in which the kings were expelled and the monarchy was abolished. Two consuls were elected every year, and at first only patricians were eligible to the office. Later the consulship was thrown open to the plebeians. The insignia of the consul were the purple-bordered toga, a staff of ivory, an ornamental chair, and twelve *lictors*, who preceded him bearing *fascies* and axes. In times of emergency, the consuls received unlimited power, but their authority was not so extensive in the later days of the republic as in its early years. Under the emperors, still later, the office became merely honorary. See **LICTORS**, **FASCES**.

CONSUMPTION, *kon sump' shun* (IN ECONOMICS). A farmer raises sheep and sells their wool to a manufacturer, who makes it into cloth. The manufacturer sells the cloth to a garment-maker, who fashions some of it into a suit of clothes, which he in turn sells

to the clothing merchant; then, the suit is purchased by the farmer who first sold the wool. Finally, the suit becomes so worn that it has to be cast aside. In the hands of the manufacturer, the wool disappeared as wool, but reappeared as cloth. In the hands of the garment-maker, the cloth was made into garments, although it was still cloth, but the use to which the farmer put the suit caused the cloth to wear out, or to be consumed. This use of commodities to satisfy a human want is called *consumption* by economists.

There are two kinds of consumption, *productive* and *final*. In the illustration given above, the usefulness of the material was increased with each change until it reached the farmer; therefore the manufacture of the wool into cloth and of the cloth into clothing was *productive* consumption, but the wearing out of the suit by the farmer was *final* consumption.

The satisfying of human wants is the aim of all consumption. However, in order that the highest aim may be realized, it must be certain that a real need exists. There is a difference between consumption and destruction. The burning of wood for fuel is consumption, but burning it in a forest fire is destruction, since no need is satisfied. Food consumed by people is final consumption, since it is not directly changed to more useful commodities, as in the foregoing example of the farmer, the manufacturer, and the tailor.

Laws which aim to control consumption by prescribing the dress and food which the members of different classes may use are known as *sumptuary* laws. A nation's laws forbidding the manufacture of intoxicating liquor are an illustration of this class of legislation. E.J.

CONSUMPTION, a disease. See TUBERCULOSIS.

CONTEMPT, *kon tempt'*, in law, is wilful disregard or disobedience of public authority, such as a court or legislative assembly, generally consisting in failure to obey its specific demands, or in insults. Contempts of court are of two kinds; the first are such as are committed in the presence of the court, which interrupt its proceedings, and the second consists of contempts arising from a refusal to comply with an order of court. Both are punishable by fines or by fines and imprisonment in the county jail, in the discretion of the court.

CONTEMPT OF COURT. See WITNESS.

CONTINENTAL CODE. See TELEGRAPH.

CONTINENTAL CONGRESS. In the troubled days prior to the Revolutionary War, the colonies were gradually drawn together by a common feeling that in union there is strength. After the passage of the Boston Port Bill (which see), there was a general impulse to hold a colonial convention

to consider the difficulties which were the common problem of all the colonies. In response to a call by the Massachusetts Assembly, the First Continental Congress met September 5, 1774, in Philadelphia.

The meeting was attended by fifty-five delegates, representing twelve colonies. Georgia was not represented, but agreed to concur in the plans of her sister colonies. Among the many notable men in the group was George Washington, of Virginia. Patrick Henry said of him, "If you speak of solid information and sound judgment, Washington unquestionably is the greatest man of them all." John Adams of Massachusetts was another influential member.

They were invited to meet in the Pennsylvania State House, but selected, instead, a new hall belonging to the carpenters, where there were rooms for the accommodation of committees as well as the assembly itself. Peyton Randolph of Virginia was chosen president of the Congress, and it was decided that each colony should have one vote.

The resolutions adopted by the Congress set forth the grievances of the colonies with respect to taxation and trade; the right to be represented in the legislative body of their common country was proclaimed as the foundation of English liberty; and an appeal was addressed to the sympathies of the British people.

This declaration was called a loyal petition to the king, and it contained a statement that, "Your royal authority over us, and our connection with Great Britain, we shall always carefully and zealously endeavor to support and maintain." The whole tone of the proceedings was conciliatory, though the action of Massachusetts in opposing the enforcement of recent acts of Parliament was approved. The action of this Congress was received with general satisfaction by the people of the colonies, with whom the idea of receiving just treatment was then paramount to that of independence.

The Second Continental Congress met in Philadelphia on May 10, 1775. The delegates were chosen by the colonies as before, but between their election and the time of meeting, the fight between General Gage's troops and the "embattled farmers" of Concord and Lexington had brought on a crisis. The Congress speedily became a federal union, which was in effect a government, so far as measures for the common defense were concerned. It ordered the enlistment of troops, the erection of forts, and the provision of military supplies. It voted to issue \$3,000,000 in government notes, under the sanction of "The United Colonies." Washington was selected as commander in chief of the continental army, and he was voted a salary of \$500 per month. In accepting the appointment, he said:

Lest some unlucky event should happen unfavorable to my reputation, I beg it may be remembered by every gentleman in the room, that I this day declare, with the utmost sincerity, I do not think myself equal to the command I am honored with. As to pay, I beg leave to assure the Congress that, as no pecuniary consideration could have tempted me to accept this arduous employment, at the expense of my domestic ease and happiness, I do not wish to make any profit on it. I will keep an exact account of my expenses. Those, I doubt not, they will discharge, and that is all I desire.

The Second Continental Congress continued to function until March 1, 1781, when the Congress authorized by the Articles of Federation assumed authority.

Continental Congress sessions were held in the following cities: September 5—October 26, 1774, Philadelphia; May 10, 1775—December 12, 1776, Philadelphia; December 20, 1776—March 4, 1777, Baltimore; March 4, 1777—September 18, 1777, Philadelphia; September 27, 1777, Lancaster, Pa.; September 30, 1777—June 27, 1778, York, Pa.; July 2, 1778—1781, Philadelphia.

Related Subjects. See, in these volumes, the articles: REVOLUTIONARY WAR; ARTICLES OF CONFEDERATION, UNITED STATES (History)

CONTINENTAL DEPOSITS. See OCEAN.

CONTINENTAL DIVIDE. See DIVIDE.

CONTINENTAL SHELF. See OCEAN.

CONTINENTAL SYSTEM, a system of commercial blockade against England by Napoleon, by which he sought to deprive the British Isles of all trade with the continent of Europe. This system began with Napoleon's famous Berlin Decree, November 21, 1806, which declared the British Isles in a state of blockade, and prohibited all commerce and correspondence with them. Every Englishman found in a country occupied by French troops was declared a prisoner of war; all merchandise belonging to the English was made lawful prize; and all trade in English goods was entirely prohibited. No ship coming from England or any English colony was allowed to enter any French port. England was not long in making reprisals, or retaliation. By a British Order in Council, January 7, 1807, all neutral vessels were prohibited from trading in any French port or in any country in alliance with France. France then directed the burning of all captured British goods. With the breaking up of Napoleon's power, the system entirely collapsed. On the English side, the enforcement of the Orders in Council gave offense to the United States, and was one of the principal causes of the War of 1812.

Related Subjects. The reader is referred in these volumes to the following articles.

Blockade	Milan Decree
Bonaparte, Napoleon	Orders in Council
France (History)	War of 1812

CONTINENTS. See PHYSICAL GEOGRAPHY.

CONTINO, *kon te' no*, ANTONIO, builder of the Bridge of Sighs (which see).

CONTINUATION, OR PART-TIME, SCHOOLS. The continuation, or part-time, school, as one of its chief exponents describes it, is "an open door of opportunity between the factory gate, the employment office, and the superintendent's chair." It aims to provide education for employed children during their formative and plastic years, and to further the education of adults who no longer can fit into or take advantage of the regular school courses.

All civilized countries now have laws restricting the employment of children in industrial pursuits. These laws have been established to control, first, inconsiderate parents who have sacrificed the welfare of their children for an increase in the family income, and second, greedy employers who choose to employ children rather than adults, in order to secure cheap labor. Mrs. Browning's "Cry of the Children" applies to our own age; for—

Still, all day, the iron wheels go onward,
Grinding life down from its mark;
And the children's souls, which
God is calling sunward,
Spin on blindly in the dark.

Every year many thousands of boys and girls in every state leave the regular full-time schools to enter industrial establishments. The child-labor laws very generally restrict employment, not only as to age but also as to kind of work, hours of employment, and provision as to further schooling. Part-time school laws of the states vary considerably, but the average conditions may be set forth here. Usually, they forbid any child to be employed before he has attained the age of fourteen and has completed the eighth grade, or has attended school for nine years. Every child between the ages of fourteen and eighteen who is employed must be in school part time. Between the ages of fourteen and sixteen, the child must be in school half time, unless he is a high-school graduate. If he is not employed between the ages of fourteen and sixteen, he must be in school full time. Unemployed or employed children between the ages of sixteen and eighteen must attend school eight hours per week.

The half-time arrangement is usually elastic. A child may attend for two weeks and then work two weeks, or he may follow any other program that will provide for half time in school. If there be no continuation school in his city, a pupil can arrange with the superintendent of the public or parochial schools to attend half time and thus comply with the law.

The part-time school offers educational opportunities especially to those who have definitely severed connection with the full-time school, and have begun employment. The aim is:

1. To make of each child an intelligent citizen who can be safely entrusted with power over the welfare of himself and others.

2. To develop those human qualities in the individual child which will contribute to his joy of living and to his satisfaction in the environment in which he finds himself or which he makes for himself

3. To make a better and more skilful workman—one who can find joy in his work, his increasing earning power, and his prospect for promotion.

4. To increase his satisfaction from his earnings by making him a more intelligent consumer.

While the part-time school is compulsory for a child between the ages of fourteen and eighteen, in nearly all instances it is open to any adults who wish to attend. Plumbers, carpenters, bricklayers, and other laborers are found in these schools. An opportunity is afforded mothers to study home-making. The part-time school attempts to coördinate industry and the school, so that each will supplement rather than hinder the other. It aims to reach those adults who are not provided for in the regular educational system, or who cannot avail themselves of further education through regular channels. The plan is to teach any subject to any person in any community. See EDUCATION (Modern Tendencies).

M.V.O'S.

CONTRABAND, *kon' tra band*, in commerce, means *trade forbidden by law*; more directly, it includes goods that a neutral nation is prohibited by international laws from furnishing to any country engaged in war, such as arms, ammunition, military or naval supplies, or anything which can be used in the manufacture of munitions of war. Even foodstuffs may be declared contraband, in which event the civilian population, as well as the army, may be made to suffer. Unless there are special treaties defining exactly what articles are contraband of war, the interpretation of this law often leads to much embarrassment. According to current practice, contraband of war is of two classes, *absolute* contraband and *conditional* contraband, the latter consisting of articles which are fit for but not directly necessary to hostile uses.

Another provision, insisted on by England since the wars with Napoleon, is that each belligerent shall have a right to visit and examine neutral ships to ascertain whether they carry any contraband of war which seems likely to be intended for the enemy. During the World War, England declared cotton to be contraband, as its enemy, Germany, used that important product in the manufacture of explosives. A neutral country should be able to carry on ordinary trade with people in any of the belligerent nations, except when prevented by blockade (which see).

CONTRABASS, *kon' tra base*. See BASS VIOL.

CONTRACT, *kon' trakt*, an agreement between two or more persons, whereby each of

the parties involved binds himself to do or not to do a particular thing. Such an obligation is created and determined solely by the will of the parties; the business of the law is to give effect, as far as possible, to their plain intention. All rules of the interpretation of contracts are based on this fundamental principle, and no government may in any way modify a legal agreement. The making of a contract involves two distinct acts: the making of an offer and the accepting of it. Contracts may be verbal or written, preferably the latter; those to run for longer than a year must always be in writing.

Classification of Contracts. Contracts have been divided into various groups under the law, but for general purposes they may be classified as *express* and *implied*. Express contracts are those in which the provisions are clearly stated (expressed) in the contract at the time it is made. Implied contracts are those in which some of the things to be done are not specified, but are left to the understanding of the parties. In case of a dispute, the provisions of an implied agreement are determined by circumstantial evidence, showing the intent of the parties.

Requirements of a Legal Contract. A contract to be legal must fulfill the following requirements:

(a) It must be made by competent parties. Since the violation of a contract makes the offender liable to the payment of damages, it is important that only responsible persons be permitted to enter into such agreements. A lunatic or an idiot, or a person so under the influence of intoxicants as to be unable to exercise his free will, cannot enter into a contract which the law will uphold. Under the common law, a contract made by a married woman is also void, but this disqualification has been removed by statute in many countries. The contract of a person under the age of twenty-one (legally an *infant*) is not binding upon him, unless it be for something that is necessary to life or intended to promote his education. However, a minor's contract binds an adult with whom he may enter into an agreement. The minor may sue, but cannot be sued, upon his contract, and he may repudiate or affirm such contract when he becomes of legal age. Contracts are also illegal and void if made between citizens of two countries which are at war.

(b) For an agreement to be legally binding, the assent to its terms must be real. That is, the minds of both parties must be in accord. A contract obtained by compulsion, fraud, misrepresentation, or through a clearly proved mistake on the part of the contracting parties cannot be enforced.

(c) The thing which the persons entering into the agreement contract to do must be lawful. Betting and gambling agreements, contracts in which illegal rates of interest are imposed, and agreements in restraint of trade are void. An agreement in restraint of trade is one that tends to interfere with the right of either party to engage in a particular business. For example, A may sell his grocery store to B, and agree in writing never to engage in the grocery business again in the same state. Such a contract is not

legal, for it prevents A from engaging in a legitimate business which would not interfere with B's success. But if A contracted to refrain from starting a grocery store in the same town for a period of ten years, the agreement would be lawful.

(d) To constitute a contract, the agreement must provide for a consideration or its equivalent. That is, if A promises to do something for B for nothing there is no contract, for B has not bound himself to give anything in return. The law in such a case will not compel A to abide by his promise. As to the adequacy of the consideration, that matter is left to the judgment of the contracting parties. However, where the rights of creditors of either party are involved, gross inadequacy of consideration may be ground for contesting the contract.

Discharge of Contracts. When the obligations of an agreement have been fulfilled, the contract is said to be discharged. The ordinary method of discharge is the performance of the things agreed upon to be done. In some cases, the words "to perform to the other's satisfaction" are inserted, but one should be cautious about signing such an agreement. If one of the contracting parties is unscrupulous, he may use such a condition as an excuse for avoiding just payment. As a contract usually calls for the performance of certain acts by both parties, one party cannot demand performance of the other unless he himself has fulfilled his obligations. If a contract is broken and damages are liable to result, the parties may agree upon the sum to which the injured person is entitled as compensation, but if such an agreement cannot be reached, there may be an appeal to the courts.

If one party to a contract wilfully alters the instrument so as to change the effect of the agreement, the other party is relieved from his obligation. Tampering with a paper by a third party, however, called *spoliation*, has no effect on the original agreement. Contracting parties may by mutual consent agree to terminate a contract. Death of a party, except where his contract was for personal services, does not terminate the agreement, as the heirs may be held.

E.D.F.

CONTRACT BRIDGE. See **BRIDGE** (game).

CONTRERAS, *kon tra' ras*. **BATTLE OF.** See **MEXICAN WAR**.

CONVECTION, *kon vek' shun*. See **HEAT**.

CONVENTION. See **POLITICAL PARTIES**.

CONVICT LABOR, the system introduced into prison life in the nineteenth century by which prisoners are employed in some form of productive work, to help defray expenses of their maintenance. In former periods, idleness in prisons was the rule.

There are two types of convict labor. Under the first, profits from labor are shared by the state with private individuals or firms. This method is subdivided into three divisions, the *contract*, the *lease*, and the *piece-price* systems. Under the lease system, practiced

now in few states, the convicts are leased to contractors for fixed prices and definite periods. Under the contract system, any firm may purchase the labor of a specified number of convicts; it provides that the work shall be done within the prison walls, but under direction of the contractor, the latter furnishing the raw material and paying a stated amount for the labor. The convict usually receives no income. In the piece-price system, the prison officials oversee the work, and payment is made on the basis of each article produced and accepted.

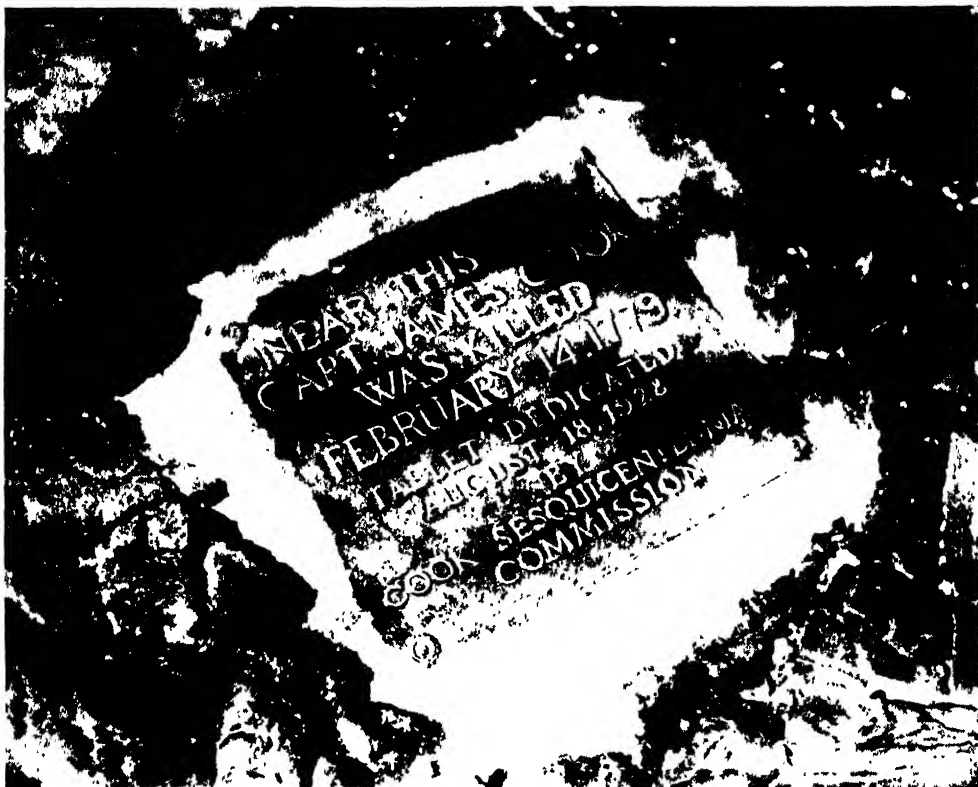
The second type is known as the *state use system*, and it is growing in many of the states. It has been authorized by the Federal government for the Atlanta and Fort Leavenworth penitentiaries. All materials are provided by the state, and state officials supervise the work. The profits are turned over to the public funds. Only such articles may be made as will be utilized in other public institutions. The same procedure, in general, is used in the *public account system*, except that the products are sold in the open market, and thus come in competition with free labor. The *public works and ways system* is generally regarded as the most satisfactory of the convict-labor systems, since it employs prisoners, selected according to their responsiveness to constructive discipline, on state-road work, drainage and reclamation projects, state farms, colonies, etc., where conditions are favorable to health and moral improvement. It is being adopted by an increasing number of states, especially in the South and West.

Another improvement in penal methods now being introduced into many states is the payment of a small wage to prisoners. While this costs a state several thousands of dollars per year, the investment appears to be profitable from every point of view. The prisoners work more willingly and respond better to discipline. Frequently the penitentiary earns the state yearly profits, amounting to over a million dollars in a few instances.

Men studying prison-reform questions now advocate industrial and vocational training, especially for the younger men. Among the latest advances in prison life is the honor system outside of prison walls, which has been found to work well in some states. This method is also a feature of discipline on some of the prison farms, as in Illinois, where convicts are employed and placed on their honor. Occasionally prisoners escape under this system. L.L.B.

[For treatment of prisoners in penitentiaries, see the article **PRISON** (Prison Reform).]

CONVOLVULUS, *kon vol' vu lus*, the type genus of the morning-glory family, *Convolvulaceae*. The name, from the Latin for *to roll around or twine*, refers to the twining or climbing habits of these plants. The genus is made



A NOTABLE TABLET. IT IS UNDER WATER

Photo U & U

What is probably the only tablet ever placed below the surface of the sea is one of bronze under the waters of Kealahou Bay, which wash the shore of the Island of Hawaii. It marks the spot where Captain Cook was slain by the natives. At low tide there are a few inches of water over the memorial, at high tide it is not visible. (See page 1640, for article on James Cook.)

up of nearly 150 species of herbaceous and shrubby plants. Some are common weeds, others are valuable medicinally, and others are cultivated as ornamentals. Bindweed, a weed, and scammony, a plant with laxative properties, are well-known members of the genus. The garden morning-glory, the moonflower, the sweet potato, and the jalap are members of the morning-glory family, but are placed in different genera from *Convolvulus*. B.M.D.

Related Subjects. The reader is referred in these volumes to the following articles:

Bindweed	Moonflower	Scammony
Jalap	Morning-Glory	Sweet Potato

CONWAY, HUGH. See **FREDERICK, JOHN.**

CONWAY CABAL, ka bahl'. See **CABAL.**

CONY, ko' nie, a fur. See **RABBIT.**

COOK, FREDERICK ALBERT (1865-), an American physician and explorer who, in September, 1909, thrilled the world with the announcement that on April 28, 1908, he had discovered the North Pole. Previous to this, he had accompanied Peary as surgeon on his Arctic expedition of 1891-1892, and had been

in service in 1897-1899 for the Belgian Antarctic expedition. In 1906 he and a companion ascended Mount McKinley, Alaska, and Cook claimed they reached the summit; later this was disputed.

When he first returned from his "dash to the Pole," Cook was received enthusiastically, but soon his story was questioned. Meanwhile, Peary returned from a Polar expedition in September, 1909, with reasonable proofs of his own discovery of the Pole. Finally, after a thorough investigation, the scientists in Denmark announced that Cook's assertions were not substantiated, and he was thoroughly discredited.



Photo. Brown Bros.

EXPLORER COOK

Later, in Texas, he entered the field of speculation in oil lands, and in 1923 was convicted of fraudulent use of the mails and sentenced to fourteen years' imprisonment. He was paroled in 1930. See *POLAR EXPLORATION*; *PEARY, ROBERT E.*; *MCKINLEY, MOUNT*.

COOK, JAMES (1728-1779), one of the most famous navigators of all time, who devoted his life to exploration and practically changed the map of the world. He entered the British navy in 1755, and his first valuable service included a thorough survey of the Saint Lawrence River and the Newfoundland coast. Next he was heard of in command of a scientific expedition to the Pacific Ocean, during which he visited New Zealand, discovered New South Wales, and returned to England by rounding the Cape of Good Hope in 1771. A year later, he set out again and added greatly to his discoveries. Another expedition followed, during which he explored Cook Inlet in Alaska in a vain attempt to discover a near route to the Arctic Ocean. His rediscovery of the Sandwich Islands (now Hawaiian Islands) led to his death. Venturing ashore to demand restoration of a stolen boat, he attempted to seize the native chief and hold him as a hostage. A fight ensued in which he was killed. His wife and children were pensioned by the British govern-

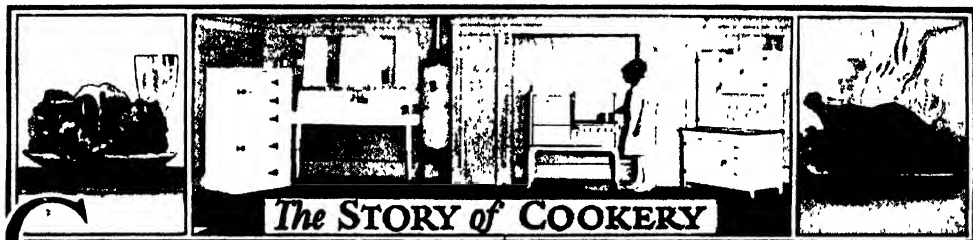
ment, and it was declared that high honors would have been bestowed on him had he returned to England. See illustration, page 1648.

Related Subjects. The reader is referred in these volumes to the following articles.

Australia (History)
Flattery, Cape

Oregon (History)
Sandwich Islands

COOKE, JAY (1821-1905), a famous American financier who rendered invaluable service to the United States during the War of Secession as the chief financial agent of the government. All of the great war loans, together reaching a total of \$2,000,000,000, were negotiated by him. He was born in Sandusky, O., and began his career in 1838 as a clerk in the banking house of E. W. Clarke & Co. of Philadelphia. Four years later, he became a junior member of the firm, and in 1861 established in Philadelphia the famous banking house of Jay Cooke & Co. The national banking system organized during the war had his warm approval, and he was helpful in popularizing it. In 1873 his great banking company failed as a result of investing too heavily in Northern Pacific Railroad stock, a failure that helped to bring on the financial panic of that year. Cooke later built up another fortune, partly by investing in Western lands, and all claims against him were paid.



COOKERY, the art of making food attractive, savory, and appetizing by various methods, most of which involve heat. The most important of these methods are boiling, steaming, roasting, broiling, frying, and baking. Just when man discovered that his food tasted better cooked than raw is not known, but it may have come about in some such way as Charles Lamb describes in his *Dissertation on Roast Pig*:

Bo-bo, a little Chinese boy, accidentally set fire to his father's house and burned up several little pigs that were kept in it. On feeling of one of the sizzling odies to see if it had any life remaining, he burnt his fingers, and of course thrust them into his mouth. To his astonishment, he found that the juicy pieces which stuck to his fingers were the most delicious food he had ever tasted, and as a result of his adventure, oast pig and the knowledge of roasting became common throughout China.

This fanciful little story suggests one reason for cooking. Cooking not only develops flavor,

but it makes many foods, especially meat, more attractive in appearance, thereby stimulating the appetite and aiding digestion by increasing the flow of the digestive juices. Cooking kills harmful microbes that are a source of disease, and it also brings about chemical and physical changes in the food, such as the softening of connective tissue in meat, and the changing of starch into a gummy substance known as dextrin (which see). These physical and chemical changes make it easier to masticate and digest the food.

What a man eats is so intimately connected with his health and happiness that the preparation of foods bears a direct relation to the prosperity and welfare of a nation; therefore, cooking is becoming more and more recognized as a science. As a result, courses in cooking are being quite generally introduced into the public schools. Pupils in cooking classes are not only taught how to prepare various foods, but they also learn that foods vary in

their nutritive value, and that this value depends upon their chemical composition. Every person whose duty it is to prepare meals should understand the comparative nourishing qualities of the foods in common use.

Time Tables. The following tables show the time required for cooking most of the staple foods:

Time Required for Roasting or Baking Meats and Fish

Beef, ribs or loin, rare, per pound	8 to 10 minutes
Beef, ribs or loin, well done, per pound	12 to 16 minutes
Mutton, leg, rare, per pound	10 minutes
Mutton, leg, well done, per pound	14 minutes
Lamb, well done, per pound	15 to 18 minutes
Veal, well done, per pound	18 to 20 minutes
Pork, well done, per pound	20 minutes
Chicken, per pound	15 or more minutes
Turkey, 8 to 10 pounds	3 hours
Goose, 8 to 10 pounds	2 hours or more
Duck (domestic)	1 hour or more
Duck (wild)	15 to 30 minutes
Pigeons (potted or en casserole)	2 to 4 hours
Ham	4 to 6 hours
Fish, whole, as bluefish, salmon, etc	1 hour or more
Small fish and fillets	20 to 30 minutes
Baked beans with pork	6 to 8 hours

Do not season with salt until the meats are nearly done, as salt draws out the juices and toughens the fiber, making the meat dry and tasteless.

Broiling

Steak, 1 inch thick	4 to 10 minutes
Steak, 1½ inches thick	8 to 15 minutes
Lamb or mutton chops	6 to 10 minutes
Squabs	10 to 12 minutes
Spring chicken	20 minutes
Shad, bluefish, etc	15 to 20 minutes
Small fish, trout, etc	5 to 12 minutes

Frying

Whitebait, croquettes, fish balls	1 minute
Muffins, fritters, and doughnuts	3 to 5 minutes
Breaded chops	5 to 8 minutes
Smelts, brook trout, etc	3 to 5 minutes

Boiling Meat and Fish

Braised meats	3 to 5 hours
Fresh beef	4 to 6 hours
Corned beef (rib or flank)	4 to 7 hours
Corned tongue	3 to 4 hours
Leg or shoulder of mutton	3½ to 5 hours
Leg or shoulder of lamb	2 to 3 hours
Turkey, per pound	15 to 18 minutes
Chicken, 3 pounds	1 to 1½ hours
Ham	4 to 6 hours
Lobster	25 to 30 minutes
Codfish and haddock, per pound	6 minutes
Halibut, whole or thick piece, per pound	15 minutes
Bluefish, bass, etc., per pound	10 minutes
Salmon, whole or thick cut	10 to 15 minutes
Small fish	6 to 8 minutes
Clams and oysters	3 to 5 minutes

Green Vegetables

Green peas, young and fresh	15 minutes
Green peas, old and not fresh	30 minutes
String beans	45 minutes
Beans, shelled (green)	45 minutes
Lima beans, young, fresh	30 minutes
Lima beans, dried (soaked)	45 minutes

Cabbage, whole head, simmer	2 hours
Cabbage, half head	1 hour
Cabbage, chopped	20 minutes
Cucumbers, cut into quarters	30 minutes
Squash, pared and cut into blocks	20 minutes
Pumpkin, in squares for pies	30 minutes
Tomatoes, peeled and stewed	30 minutes
Tomatoes, baked, whole, slow oven	1 hour
Tomatoes, stuffed and baked	1 hour
Onions, new	45 minutes
Celery, stewed	30 minutes
Spinach	10 minutes
Brussels sprouts, fresh	30 minutes

In cooking underground vegetables, use boiling, unsalted water to start, adding salt when they are partly cooked.

Dry and Underground Vegetables

Potatoes, to boil until they can be easily pierced to center with a fork	30 minutes
Potatoes, to bake, slowly	45 minutes
Potatoes, to cut into cubes, to cream	10 minutes
Beans, soup, dried, soaked over night, slowly	2 hours
Peas, dried, soaked over night	2 hours
Sweet potatoes, medium size, to boil	40 minutes
Sweet potatoes, medium size, to bake	45 to 50 minutes
Turnips, white, cut into blocks, to stew	20 minutes
Turnips, yellow, cut into blocks, to stew	30 minutes
Carrots, cut into cubes, to stew	1 hour
Parsnips, cut into halves	1 hour
Beets, new	45 minutes
Beets, old	4 hours
Asparagus	45 minutes
Green sweet corn, after it begins to boil	5 minutes

Oven Temperature and Time Required to

Bake Bread, Cake, and Pastry

Bread (in small French loaves)	at 340° for 30 minutes
Bread (square loaves)	at 280° for 30 minutes
and for 50 minutes at 240°	
Corn bread (in shallow pans)	at 340° for 45 minutes
Pies, with upper crust	at 340° for 30 minutes
Pies, with under crust	at 320° for 30 minutes
Patties and tarts	at 340° for 20 minutes
Muffins and gems	at 340° for 20 minutes
Cakes without butter require a hot oven	280° to 340°
Four-egg sponge cake	20 minutes
Six-egg sponge cake	30 minutes
Ten-egg sponge cake	45 minutes

Angel food and sunshine cake require a moderate oven, 210°, which is gradually increased during the first half hour to 240°, baking, in all, three-quarters of an hour.

Pound cake, cup cake, fruit cake, and others containing butter must be baked in a very slow oven.

If the stove is not provided with a temperature indicator, the heat of the oven may be determined in the following manner: Place a piece of white paper on the oven shelf; if it browns in three minutes, the oven is very hot; if it browns in five minutes, it is hot; if it browns in seven or eight minutes, it is moderate.

E. V. M'C.

Related Subjects. The fundamental principles of dietetics are treated in these volumes in the articles on Food and Nutrition, and in other articles indexed therewith.

COOK ISLANDS, a group in the South Pacific Ocean. See map, PACIFIC ISLANDS.



The STORY of the THIRTIETH PRESIDENT

COOLEDGE, CALVIN (1872-), thirtieth President of the United States, one of the youngest of the nation's Chief Executives, and the sixth "accidental President." He reached the most exalted station within the gift of the American people from the office of Vice-President, on the death of Warren Gamaliel Harding, which occurred on August 2, 1923. He completed the four-year term to which Harding had been elected, and on March 4, 1925, began an administration of his own, for in the preceding November he had been elected President by the greatest popular plurality that had ever been given to a Presidential candidate.

[An "accidental President" is one who succeeds to the office of Chief Executive on the death, removal, or disqualification of the incumbent. Previous to the succession of Vice-President Coolidge, John Tyler completed three years and eleven months of the term of William Henry Harrison; Millard Fillmore succeeded Zachary Taylor, who died in the sixteenth month of his administration, Andrew Johnson served nearly all of the second term to which Abraham Lincoln had been elected; Chester Alan Arthur was President for three and one-half years because of the assassination of James A. Garfield; Theodore Roosevelt completed the second term of the martyred William McKinley.]

Early Life. Coolidge was born on July 4, 1872, near Plymouth, Vt., a small village in the central part of the state. The boyhood and youth of this future President were not unlike those of other boys on the farms in the hills of Vermont. Life was not easy, yet if it had been suggested that it was monotonous, the good people of the section doubtless would have wondered at the imputation. In a speech in later years, while on a visit home, Coolidge doubtless voiced the outlook on life that was held by his neighbors:

Vermont is my birthright. Here one gets close to nature; in the mountains, in the brooks, the waters of which hurry to the sea; in the lakes, shining like silver, in their green setting; in the fields, tilled not by machinery, but by the brain and hand of man. My folks are happy and contented. They belong to themselves, live within their income, and fear no man.

In such an environment, a part of the life of the people whose principles he so tersely de-

scribed, young Coolidge passed his early years, and in that formative period developed those characteristics of the community for which he later became famous—"belonged to himself; lived within his income; feared no man." For, in later years, as governor of Massachusetts and as President of the United States, he was known and honored for his straightforward and unswerving attitude on all questions confronting him; these he decided without the slightest reference to their influence upon his popularity as a man or as an official. Equally was he noted for his efforts to enforce reduction in public expenditures; the term "Coolidge economy" he could well accept as a compliment. To say that he feared no man among those with whom he measured strength is not to infer the possession of a blustering, combative disposition; quite the opposite was true. In his capacity of public servant, he was self-effacing, calm; seldom did he display anger in his official relations, but fear of the opinions of his fellow citizens did not swerve him when he had thought to the end of a problem and had reached conclusions as to his duty. Vermont, in the '70's and '80's, had set their mark upon the boy.

Young Coolidge attended the village school, then advanced to academic training in Black River and Saint Johnsbury. He was able soon to reach the goal of many ambitious boys of New England—matriculation in Amherst College. He was graduated in 1895 with the degree of Bachelor of Arts, *cum laude* (with praise), a designation of scholarship. In his senior year, he won a competition, open to the students of all colleges, for the best essay on "The Principles for Which the Revolution Was Fought."

Immediately after leaving college, he was given the opportunity to study law with a firm of lawyers in Northampton, Mass., and two years later (1897) he was able to pass the bar examination. He opened a law office in the town, and Northampton has continued to be his legal residence.

Political Opportunity. The law business was fairly profitable; it afforded him enough money for the needs of a "Vermont Yankee," but he had time, when clients were scarce, to amass

capital of another kind. He made a deliberate study of politics. To him it became a profession as interesting as that of the law, and it may be taken for granted that he mastered its intricacies, for it is a matter of record that



Photo U & U

CALVIN COOLIDGE

Thirtieth President of the United States.

in his rise from humble station through various elective offices, he never was defeated in a contest at the polls. He said once that—

Politics is not an end, but a means; it is not a product, but a process. It is the fine art of government. Like other values, it has its counterfeits. It is the process of action in public affairs.

Coolidge's study of politics and the conclusions reached by his penetrating mind had a result which must account for much of his uniform success in reaching the posts he sought from time to time. In every office he ever held, he proved himself more than the average nominal, time-serving incumbent. He was a student; he always sought opportunity to dignify the office.

Beginning of His [Public Career. Two years after Coolidge was admitted to the practice of law, he was elected to the city council of Northampton. This was in 1899, when he was twenty-seven years of age. In the next two years he served as city attorney; in 1904 he was selected as clerk of the county court, and in 1907-1908 was a member of the General Court of Massachusetts.

[It was during these years that he married Grace Goodhue of Burlington, Vt. The union was solemnized on October 4, 1905. Grace Goodhue Coolidge proved to be no small factor in giving to her husband the popularity which he enjoyed. In 1927, when it was believed that the President would be nominated for a second full term, politicians unreservedly declared that "Mrs. Coolidge is worth a million dollars to the Republican party." (See her biography, at the end of this article)]

In 1907 the future President was elected to the office of representative in the state legislature. His opponent expected an easy victory, as Coolidge did not appear to be making a serious effort to secure votes; but after the election, when the local strategists sought the reasons for the Coolidge victory, it was discovered that he had won because he had presented his case privately to nearly every man of whose vote he was not fairly assured. When he went to Boston to take his seat as representative, a local judge sent this note to the speaker of the house: "Dear John: Look after this young man. Like the singed cat, he is better than he looks."

In 1910 he was back in Northampton, and was elected mayor.

Reënters State Politics. From this second period of local fame he again entered the state political field in 1912, as a member of the state senate. In 1914-1915 he was the presiding officer of that body. At this time, the country first became aware of a trait of the man which, strangely, was to prove an asset: he said little. He early developed what appeared to be a passion for clarity of expression, and he became famous for brief utterances full of rock-bound New England common sense. President Nicholas Murray Butler of Columbia University once said of him:

Often his sentences are texts rather than argument. The Massachusetts of Samuel Adams, of Fisher Ames, of Daniel Webster, and of John A. Andrew speaks with the voice of Calvin Coolidge.

In a brief address at the beginning of the legislative session when he became president of the state senate, his conciseness might have marked him as descending from one of the first families of old Laconia; no other public utterance could better outline his political creed and illustrate his tendency toward brevity of speech. He said:

Honorable Senators, my sincerest thanks I offer you. Conserve the firm foundations of our institutions. Do your work in the spirit of a soldier in the public service. Be loyal to the commonwealth and to yourselves. And be brief; above all things, be brief.

And again, to the senators, in pointing the way to political honesty:

Do the day's work. If it be to protect the rights of the weak, whoever objects, do it. If it be to help a powerful corporation better to serve the people,

whatever the opposition, do that. Expect to be called a standpatter, but don't be a standpatter. Expect to be called a demagogue, but don't be a demagogue. Don't hesitate to be as revolutionary as science. Don't hesitate to be as reactionary as the multiplication table.

In 1916 Coolidge was elected lieutenant governor of Massachusetts, and he held this post for three years. He had asked for the offices of mayor, president of the state senate, and lieutenant governor; in 1918 he thought that on his record he deserved the governorship of the state, and he asked for that office. The people elected him.

A National Figure. The people of the United States knew practically nothing of the man at that time, but a circumstance in the line of his duty as governor focused the attention of the nation upon him. The police force of Boston declared a strike, and a large number of its members deserted their posts. Governor Coolidge called out the entire state guard to preserve order; he denounced the strikers in strongest terms, and drew a protest from Samuel Gompers, president of the American Federation of Labor. Coolidge replied that—

... there is no right to strike against the public safety by anybody, anywhere, any time. . . . You can depend upon me to support you in every *legal* action and sound policy. The right of the police in Boston to affiliate in a labor organization has *always* been questioned, *never* granted, and is now *prohibited*.

Governor Coolidge crushed the insurgency with such effectiveness that the news spread sensationally throughout the country. The Democratic President, Woodrow Wilson, wrote a letter of commendation to the Republican governor. The incident of this local strike is related here in some detail, for the reason that it had a profound influence upon the trend of events which followed.

Presidential Year of 1920. On his record, Coolidge was put forward as a candidate for the Republican nomination for the Presidency, and his name was presented to the national convention. It has been declared that if all the candidates for the position had been reduced to two; that if the two had been Harding and Coolidge, and if at that time there had been a referendum on them, the governor of Massachusetts would have been given a very large majority of the votes, so much did he overshadow at the moment the popular Senator from Ohio.

In the convention, Harding won the nomination on the tenth ballot; Coolidge won the nomination for Vice-President by acclamation. In political jargon, Coolidge was named "to strengthen the ticket," for it was conceded that he was of Presidential stature.

The Republican ticket headed by Harding and Coolidge received the largest popular vote that had ever been recorded in a Presi-

dential election. Out of a total vote of 26,742,313, the Harding-Coolidge electors were given a majority of 7,004,847 votes. On March 4, 1921, the new Vice-President took office as President of the United States Senate. The traditional silence of the incumbent of that office did not worry Coolidge. It had been remarked by his predecessor, Thomas Marshall, that—

The Vice-President of the United States is like a man in a cataleptic fit, he can see everything that is going on, but he cannot say a word.

The silent Coolidge knew well what was going on; but from 1921 to the date of the death of Harding, there was little new opportunity to learn, from anything he said or did, what opinions he held on national questions. When, on August 2, 1923, the unexpected death of the President elevated the Vice-President to the post of Chief Executive of the nation, he was the subject of bewildered conjecture. He was termed an enigma, a mystery.

Succeeds to the Presidency. When Harding died, Coolidge was spending his vacation on the Vermont farm of his father, John C. Coolidge. At two o'clock in the morning of August 3, a little drama, unique in the history of the United States, was enacted in the small parlor of the Coolidge farmhouse. The Presidential oath of office was administered to Calvin Coolidge by his father, a justice of the peace of his township. Never before had such a minor judicial officer officiated on an occasion so momentous.

Administrations of President Coolidge. Coolidge succeeded a President whose brief administration had become the object of much criticism, not only in the opposing party, but also in his own. Harding was charged with poor judgment in the choice of some lieutenants in responsible positions, and he was blamed for preserving strong loyalty to them when they came under suspicion of wrongdoing. On the other hand, though he was under obligations to powerful politicians for his nomination, he showed a commendable independence at times in resisting pressure for favors to them and their friends; this unresponsive attitude turned many influential men against him, and increased the difficulties of his position.

Coolidge inherited a situation which was full of unpleasantness. For nineteen months he was called upon to execute the duties of an office whose broader policies had been already formulated, and which it was expected he would carry out. He therefore felt that he should not alter the general trend of the administration; he bore no mandate direct from the people.

It so happened that Harding's mistakes began to bear fruit, and in the embarrassing situation which developed, Coolidge was not

in a position to inaugurate new policies, even had he desired to do so. The Congress busied itself in an attempt to undo certain acts which Harding had permitted, but for which no personal advantages had been sought by him.

Teapot Dome Investigation. In 1922 it became known that a great oil field located about forty miles from Casper, Wyo., which had been set aside by the United States government as a naval oil reserve, had been leased by Albert B. Fall, Harding's Secretary of the Interior, to private interests. The outcome of this misuse of government property was a scandal that put the Republican party on the defensive through two Presidential terms. "Teapot Dome," the name of the oil field mentioned above, has reference to a rock of bluish-white sandstone, half a dozen miles from the government properties, and bearing a fancied resemblance to the silhouette of a teapot. Some time after Secretary Fall's indiscretion had brought on an investigation, a storm removed the "spout" of the rock, but the name "Teapot" had become historic and continued to be used in connection with this investigation. The basic facts relating to the Teapot Dome scandal are, in brief, as follows:

President Wilson, adhering to the conservation policies of two preceding administrations, created a naval oil reserve, 9,481 acres in extent, near Teapot Dome, in Natrona County, Wyo. This reserve was specifically withdrawn from every form of private entry, and held for naval use exclusively. Meanwhile, however, various private interests had laid out claims to sections of the oil properties, and to some of these holders the government had granted patents.

In 1920 Congress authorized the Secretary of the Navy to conserve and develop the oil deposits, and empowered him to use his discretion as to leasing or exchanging any portion of them, or entering into contracts thereto. In May, 1921, President Harding signed an order that turned over the Wyoming oil reserve to the Department of the Interior, the order having been prepared by Secretary Fall, and approved by Edwin Denby, Secretary of the Navy. Coincidentally, Harry F. Sinclair, of the Sinclair Consolidated Oil Company, purchased a majority of the Teapot Dome private claims, both valid and spurious, and organized them under the name of Mammoth Oil Company.

On April 7, 1922, Secretaries Fall and Denby jointly leased the entire area to the Mammoth Company for a period of twenty years. The lease covered all rights of development, and the United States government was to receive for the navy a portion of the oil brought from underground. Secretary Fall also leased to Edward Doheny, a petroleum magnate, the Elk Hills reserves in California. The latter afterward gave to Secretary Fall a satchel containing \$100,000, which both men declared was a loan. This incident entered into the investigations, though it was not directly connected with the Teapot Dome affair.

When the negotiation of the oil leases was made public, a storm of protest arose in the Senate, which quickly approved a resolution

offered by Senator La Follette, demanding an investigation. A committee was appointed for the purpose, and in March, 1923, Secretary Fall resigned. Before the investigating committee actually began to function, President Harding died. Thus Coolidge, at the beginning of his administration, found himself confronted with a most difficult situation. Refraining from any denunciation that would reflect upon his predecessor (Harding's friends insisted that he had been imposed upon and was guiltless of intentional wrongdoing), Coolidge appointed two able attorneys, Atlee Pomerene and Owen Roberts, to represent the government in the investigations and whatever prosecutions might ensue. [Fall was convicted in 1929.]

In 1924 Secretary Denby and Attorney-General Daugherty resigned their Cabinet positions, under pressure of public opinion and Senatorial criticism. Subsequently, Fall, Sinclair, and Edward Doheny and his son were indicted on charges of conspiracy, additional charges of bribery being preferred against Fall and the Dohenys. The trial of these cases and of others involving charges of contempt of the Senate occupied the remainder of Coolidge's first term and a portion of his second administration. No convictions were secured, but the evidence of wrongdoing in high places was deplored by leaders in both parties. President Coolidge was criticized for his lack of vocal condemnation of the accused; his personal integrity never was questioned. The United States Supreme Court, in 1927, ruled that the Teapot Dome and Elk Hills leases were fraudulent and void, and the valuable oil properties in both states were returned to the government.

Election of 1924. In his quiet way, Coolidge made a good impression in the interval between his accession to office and the opening of the Presidential campaign in 1924. He had followed Harding's policy of reducing the public debt and lowering taxes, and though Congress overruled him in regard to the so-called soldiers' bonus and the question of Japanese exclusion, the people at large believed that the man in the White House was of Presidential caliber and would safeguard their interests. He had risked incurring the antagonism of the war veterans when, in December, 1923, he said tersely, in his message to Congress, "I am opposed to the bonus." Also, the more radical elements in the party were opposed to his conservatism. Nevertheless, the widespread popularity of the President was revealed in the spring primaries in 1924, when he defeated Senator Hiram Johnson of California in nearly every contest. Coolidge sentiment outside of Congress was, in fact, so widespread and unmistakable that, two months before the nominating convention, Senator Johnson withdrew from the race.

ADMINISTRATION of COOLIDGE

1923

1929



Inherited
Teapot Dome Scandal



Immigration reduced



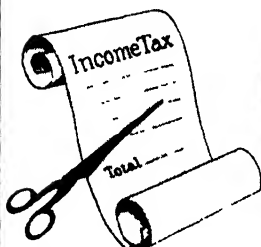
Calvin Coolidge, Jr.
Died July 7, 1924



Armament Conference, 1927



The Nation becomes
air-minded



Income Tax reduced



Lindbergh Honored



Marines in Nicaragua



Mississippi Flood, 1927



When the Republicans met in Cleveland, O., in June, Coolidge was nominated almost without opposition, and it was generally agreed that the ticket was strengthened by the Vice-Presidential choice—Charles G. Dawes of



ELECTION MAP OF 1924

Chicago. As head of the reparations commission that reorganized the finances of Germany, Mr. Dawes had displayed great capability and his picturesque manner of speech and habit was considered a good foil for the reticence of Coolidge.

The radical elements in the party flocked to the leadership of Senator La Follette of Wisconsin, and, joining with dissatisfied Democrats, organized a Progressive party that nominated La Follette for President and Senator Burton K. Wheeler (Democrat) of Montana, for Vice-President. The regular Democrats, in their New York convention, chose John W. Davis, former ambassador to Great Britain, and Charles Bryan, Governor of Nebraska, as their nominees. President Coolidge stood on his record, and in the November election he was chosen by a plurality reaching 7,339,417 votes over the combined opposition of the Democrats and Progressives. His was the largest popular majority that had ever been received by a Presidential candidate in the history of America. His joy in the expression of the nation's confidence was tempered by the death of his youngest son, Calvin, who had succumbed to septic poisoning in the preceding summer.

Coolidge Economy. Having won a mandate directly from the people, the President announced in his inaugural address on March 4, 1925, that continued emphasis would be placed on the reduction of government expenditures. In this connection he said:

I favor the policy of economy not because I wish to save money, but because I wish to save people. . . . The collection of any taxes which are not absolutely required is only a species of legalized larceny. . . . The result of economic dissipation to a nation is always moral decay.

He had inherited from the preceding administration a most able Secretary of the Treasury—Andrew W. Mellon—who consented

to remain in the Cabinet. Secretary Mellon was heartily in accord with the President's ideas on the budget, on taxation, and on reduction of the national debt, and his management of the country's finances gave substance to, and assured the success of, those policies that stamped the Coolidge administration as one of thrift and efficiency. During nearly six years that Coolidge held office, three general tax reductions took place, the national debt was reduced about a billion dollars a year, and always there was a surplus in the Treasury.

Foreign Affairs. In one of his messages to Congress, the President said: "We are a peaceful people and committed to the settling of disputes by amicable adjustment rather than by force." This statement epitomizes the policy of the administration in its attitude toward foreign countries. The desire of the President to preserve a world-wide spirit of amity had its culmination in an American proposal for a treaty renouncing war as a method of settling disputes. Sponsored by Secretary of State Frank B. Kellogg, this movement received dramatic fulfillment on August 27, 1928, when representatives of fifteen nations, in conference in Paris, affixed their signatures to a multilateral treaty "binding them to seek only by pacific means the solution of all disputes that may arise among them." On the same day, about fifty other nations were invited to become signatories, so that virtually the whole civilized world was represented in this effort to outlaw war.

The settlement of the debts incurred by European nations during and after the World War was a major problem of the administration. Between August, 1925, and May, 1926, thirteen countries of Europe entered into agreements with the United States as to the funding of their debts and the payment of interest charges.

Disturbed conditions in China made it necessary to dispatch naval and marine forces to that country to protect American interests, and a similar situation arose in Nicaragua. In the latter country, American marines assisted in quelling a rebellion led by General Sandino. This action of the government, taken by request of Nicaragua, was severely criticized in Congress, but President Coolidge justified it on the ground that a heavy sacrifice of life was prevented, and that Nicaragua was saved from waste and war. As a matter of fact, the President was carrying out a policy initiated many years before. It was his consistent belief that American lives and property should be protected at any time and at any place throughout the world.

Mexico More Friendly. Diplomatic relations with the republic of Mexico had been strained for more than ten years. Controversy over oil lands held by American and British in-

terests; difficulties growing out of the depredations of Francisco Villa on American soil; the Pershing expedition into Mexico to capture the bandit leader; and more recently, the purely local religious issue, which drew much sympathy in America for the Roman Catholic population in Mexico, all tended to give Mexicans an unfavorable impression of the American republic.

President Coolidge chose a business man, not a diplomat, as ambassador to Mexico, to cope with the delicate situation, in the person of Dwight L. Morrow, a member of the New York firm of J. P. Morgan & Company. Morrow proved able to win for his country the friendship of Mexicans, not only of officials, but of the peasants, for reports of a new kind of ambassador who evinced a friendly feeling for the people penetrated to the farthest recesses of the country. Morrow suggested a visit to the Mexican capital by Col. Charles A. Lindbergh, the "ambassador of good will"; the airman completed the task of reestablishing cordial relations that had been so well begun.

The land laws were interpreted in terms favorable to the owners of record, and a new era of good feeling between the two countries was apparent.

Farm Relief. Throughout Coolidge's term there was strong agitation for legislation to help the agricultural interests, especially the farmers in the corn belt. In the deflation of prices that embarrassed American industry after the World War, the farmers were the greatest sufferers, and agriculture was the slowest industry to recover. A group of Senators and Representatives carried on an active fight for farm relief, and succeeded twice in pushing through Congress the McNary-Haugen Bill, the best known of several plans proposed as remedies.

This bill, in brief, was a plan to handle excessive surpluses of American farm products by means of a great revolving fund to be drawn from the Treasury. The fund was to be used to market the surplus products abroad, and any losses were to be made up by means of an equalization fee levied on the farmers. In May, 1928, when the bill was vetoed the second time, President Coolidge issued a lengthy statement pointing out his objection to the principle of the equalization fee, and warning the farmers of the economic dangers in the plan. Again the President risked incurring the enmity of a large element in the population; his opposition to the bill was so explicit and candid that no one could doubt his honesty, but he aroused bitter feeling in certain sections of the Middle West.

Cabinet Changes. Two original Harding appointees remained in the Cabinet throughout the entire administration—Secretary Mellon of the Treasury, and James J. Davis of the

Department of Labor. Secretary of Commerce Hoover retained his portfolio until the summer of 1928, when he resigned to direct his own campaign for the Presidency. The resignations of Fall, Daugherty, and Denby have been mentioned. Secretary Fall was succeeded in 1923 by Dr. Hubert Work, who was transferred to the Department of the Interior from the Postoffice Department; Harry S. New was made Postmaster-General. Harlan Fiske Stone succeeded Attorney-General Daugherty in 1924; in 1925 he was transferred to the Supreme Court, his Cabinet post going to the President's old school friend, John G. Sargent of Vermont. Denby's position in the Department of the Navy was filled in 1924 by Curtis D. Wilbur.

In 1925 there were three changes in personnel besides the one mentioned above. Frank B. Kellogg was recalled as ambassador to England and made Secretary of State, in succession to Charles E. Hughes; Dwight F. Davis was appointed Secretary of War when John W. Weeks resigned on account of ill health; and William M. Jardine, president of Kansas Agricultural College, was appointed Secretary of Agriculture, succeeding Howard M. Gore. No further changes occurred until the summer of 1928, when Secretary Hoover was succeeded by William F. Whiting, a paper manufacturer of Massachusetts, and Dr. Work, who resigned to become Hoover's Presidential campaign manager, relinquished his post in the Interior Department to Roy O. West of Chicago.

Progress in Many Fields. The Coolidge administration was a period of general prosperity and of freedom from labor troubles, though there were protracted strikes by both the hard- and soft-coal miners. The remarkable development of radio broadcasting brought certain problems to the fore, and led to the enactment of a radio law in 1927, authorizing the appointment of a National Radio Commission. This board, by issuing licenses, allotting wave-bands, and deciding on the number of stations permitted in any territory, has established order in the crowded field of the air. Indicative of the mechanical perfection of this miracle of the age is the fact that wireless telephoning across the Atlantic was organized on a commercial basis in 1927.

The airplane rivaled radio in achievements and publicity during the period. Colonel Charles Lindbergh's spectacular flight to Paris, in a plane piloted by himself alone, was the chief adventure among scores in the field of American aviation, while commercial and postal flying was established on a firm basis. The perfection of talking moving pictures and the invention of television were other interesting developments.

"I Do Not Choose to Run." As the last year of Coolidge's administration drew near, there was a strong feeling throughout the

OUTLINE AND QUESTIONS ON CALVIN COOLIDGE

Outline

I. Early Life

- (1) Birth
- (2) Effect of his environment
- (3) Education
 - (a) Village school
 - (b) Academy training
 - (c) Amherst College
 - (d) Law study
- (4) The Northampton lawyer

II. Early Public Career

- (1) Elected to city council
- (2) City attorney, clerk of county court
- (3) General Court of Massachusetts
- (4) State legislature
- (5) Mayor of Northampton

III. Becomes a National Figure

- (1) State senate
- (2) Lieutenant-governor of Massachusetts
- (3) Elected governor
 - (a) Calls out the state guard to preserve order in policemen's strike
 - (b) Act commended by Woodrow Wilson
- (4) Nominated for Vice-President
- (5) Succeeds Harding as President

IV. Administrations

- (1) Teapot Dome investigation
 - (a) Resignations of Fall, Denby, and Daugherty
 - (b) Restoration of oil reserves to the government

- (2) Nominated for new term
 - (a) Coolidge and Dawes ticket overwhelmingly victorious
- (3) Coolidge economy
 - (a) Taxes lowered
 - (b) National debt decreased a billion dollars a year
 - (c) Government expenditures reduced; Treasury surplus
 - (d) Wise management of Secretary Mellon
- (4) Foreign affairs
 - (a) Multilateral treaty renouncing war
 - (b) Adjustment of European debts
 - (c) Protection of American lives and property
- (5) Farm relief
 - (a) Plight of agriculture
 - (b) McNary-Haugen Bill
 - (c) Vetoed by President; objections to equalization fee
- (6) Cabinet changes
 - (a) Two appointees of Harding retain their posts
 - (b) New appointments
- (7) Progress and prosperity
 - (a) Few labor troubles
 - (b) Development of radio
 - (c) Aircraft in the limelight
 - (d) Sound pictures
 - (e) Television
- (8) President refuses another term
 - (a) Gives aid to Secretary Hoover
 - (b) Election of 1928.
 - (c) Retirement

Questions

- What is meant by the statement that Coolidge was an "accidental President"?
 How did his early environment affect his character?
 Why did Coolidge become a national figure while governor of Massachusetts?
 What opinion did he hold as to politics?
 Why was he elected so decisively, in view of the "Teapot Dome" scandal?
 Explain the significance of the term "Coolidge economy."
 What part did Charles A. Lindbergh have in the progress of aviation?
 Who were Albert B. Fall and Edwin Denby?
 What was the Treaty for Renunciation of War?
 How many Presidents have been sworn into office by justices of the peace?
 Why may not peace officers engage in a strike?
 What was the McNary-Haugen Bill?
 In what two ways were Dwight L. Morrow and Charles A. Lindbergh linked together?
 Did Herbert Hoover enter the Cabinet through appointment by President Coolidge?

country that he was the logical candidate to succeed himself. For a considerable time he deliberated, and the country was left in doubt as to his sentiments in the matter. In 1927 he and Mrs. Coolidge accepted an invitation to spend the summer months at the state game lodge, in the Black Hills of South Dakota. Many politicians interpreted this visit as a shrewd move to regain the friendly confidence of the Middle West, which it was believed had been alienated by his attitude on farm relief; how mistaken they were was shown by the laconic message he issued one day to several press correspondents: "I do not choose to run for President in 1928."

The statement caused a sensation. Some of the President's friends refused to accept the decision as final, and here and there, in different parts of the country, "draft Coolidge" movements took form. On one or two occasions, the President made known his disapproval of such activity, but he did not state, unequivocally, that he would refuse the nomination if it were offered.

Among the prospective candidates for the office, Secretary Hoover had the largest following. Ex-Governor Lowden of Illinois, Senator Curtis of Kansas, and "favorite sons" in various states were also showing some strength. In the main, it was "the field against Hoover." Shortly before the Republican convention met in Kansas City, in June, 1928, the "draft Coolidge" movement took on a new lease of life, and if the President had said the word, he probably could have won the nomination without effort. As it was, he said nothing, preventing the anti-Hoover allies from uniting on any one man, and Hoover was chosen.

As soon as President Hoover was inaugurated, the Coolidges returned to Northampton, Mass., their former home. Mr. Coolidge became a director in a large insurance company, and in the first year of his freedom wrote a book on his experiences as President and contributed a series of articles to magazines.

Grace Goodhue Coolidge (1879-), wife of the thirtieth President, a lady whose friendliness and charm were of inestimable value in advancing her husband's political career.

Grace Goodhue was the daughter of Captain Andrew Goodhue and Almira Barret Goodhue, of Burlington, Vermont. She was graduated from the Uni-

versity of Vermont in 1902, and before she married Calvin Coolidge, taught at the Clarke Institute for the Deaf, at Northampton, Mass.

Mrs. Coolidge proved to be one of the most popular and democratic of White House mistresses. She was sincere and charming, a gracious hostess, and unflinchingly showed these qualities in one of the most difficult positions a woman may be called upon to fill. She was skilled in household duties, and interested in a variety of enterprises, especially those relating to social work.

The youngest son of the Coolidges, Calvin Jr., died in the White House, July 7, 1924, as a result of septic poisoning. He was sixteen years old. His brother John, one year older, attended and was graduated from Amherst College while his parents were in the White House.

Related Subjects. The reader is referred in these volumes to the following articles:

Curtis, Charles	Hoover, Herbert Clark
Davis, John William	La Follette, Robert Marion
Dawes, Charles Gates	Lindbergh, Charles A.
Dawes Plan	Nicaragua (History)
Harding, Warren Gamaliel	Radio Communication
Renunciation of War, Treaty for	

COOLIDGE DAM. The completion in 1928 of three huge concrete, dome-shaped structures marked the last steps in the construction of the \$10,000,000 Coolidge Dam on the Gila River, east of Phoenix, Ariz. These domes, said to be the largest in the world, were designed to give the dam a maximum strength with economy of material.

The dam is located about 120 miles by road from Phoenix, the nearest large city, and eight miles from the nearest rail point. It was constructed by the United States Reclamation Service and the Indian Department, and a record for government work is claimed, in that the dam was completed about nine months in advance of schedule.

As this is the first multiple-dome dam ever constructed, engineering details had to be carried out by pioneer methods. Yet, despite the lack of precedent and the consequent necessity for pioneering, domes which involved curves in both horizontal and vertical planes were built true to design, with smoothly finished surfaces, by specially developed flexible form panels used practically without change throughout the job. These domes distribute the water pressure among a number of buttresses, thus reducing the pressure on any one.

The impounded waters of the dam will irrigate 100,000 acres. See IRRIGATION. [An illustration appears on page 1660.]

COOLIES. See CHINA; BRITISH GUIANA.

COON. See RACCOON.

COOPER, JAMES FENIMORE (1789-1851). Often called the "American Scott," and author of that stirring series of stories of frontier life, the *Leather Stocking Tales*, Cooper was the first American novelist to gain a reputation in Europe. He was born in Burlington, N. J., but when he was a year old his Quaker parents



Photo U & U

GRACE GOODHUE COOLIDGE



Photo: Engineering-News Record

Coolidge Dam. This was the first multiple-dome dam to be built. Its beehive forms distribute the water pressure among a number of buttresses.

moved their family of twelve to Otsego Lake, where they started the town of Cooperstown, N. Y. It was there, surrounded by forests and in daily contact with the red men, that Cooper spent his early life; indelible impressions were here obtained which later furnished much material for his tales of the forest.



Photo Brown Bros

JAMES FENIMORE COOPER

The discoverer of a vast new field of romance, and a most successful worker in that field.

Although Cooper studied at Yale, he was not a close student, and in his third year was asked to leave the college. He then joined the United States navy, and the knowledge and experience gained during that service make his later sea tales realistic. He married and retired from the navy just before the War of 1812. Settling at Cooperstown, he engaged in farming. One day, when reading aloud an English novel, he boasted to his wife that he could write a better novel than many of those appearing at that time. So he produced *Precaution*, a commonplace story of English high life, of which Cooper knew nothing. Advised to turn to adventure in his own country, he wrote *The Spy* in 1821, and published it at his own expense. On its appearance, he was at once recognized as a novelist of force.

Cooper as a Novelist. In the twenty years that followed, he brought out many novels, including those stirring sea tales, *The Pilot* and *The Red Rover*; also those books so popular with boys, and even girls, and retained as pleasant memories in the minds of adults, the *Deerslayer*, *The Last of the Mohicans*, by many considered the best of the series, *The Pathfinder*, *The Pioneer*, and *The Prairie*.

Although some have said that Cooper's Indians were idealized and his characters not real, and although his style is somewhat careless, he will nevertheless live in history as one of the great American writers, and as the creator of a few characters which are worthy a lasting place among personages in fiction—"Harvey Birch," in *The Spy*; "Natty Bumppo," the backwoodsman; "Long Tom Coffin," and "Uncas," the Indian. Cooper's works have been translated into many languages, and places around Otsego Lake are still pointed out to visitors as spots he invested with literary interest.

COOPER, PETER (1791-1883), a self-made American inventor, manufacturer, and philanthropist, whose successful career affords a splendid example of what may be accomplished by industry and perseverance. When Peter was a small child, the Cooper family removed from New York City, where he was born, to

Peekskill. There he lived until he was seventeen, receiving only a meager schooling, but he developed mechanical genius.

In 1808 he became an apprentice to a coach-builder in New York, at a salary of \$25 a year and his board. During his four years of service, he not only learned the trade but made several useful inventions, including a machine for mortising hubs. Later, he began the manufacture of a machine for shearing cloth, turned from that to furniture-making, and started a grocery business, all the time making money; at the age of thirty-three he laid the foundation of a great fortune by the purchase of a glue factory. Cooper's inventiveness, energy, and good sense gave him a practical monopoly of the country's trade in glue and isinglass for half a century.

In 1830 he was engaged in the manufacture of charcoal iron near Baltimore, and in the same year constructed from his own designs one of the first steam locomotives ever made, the famous *Tom Thumb*. Soon after this, he sold his iron works in Baltimore and built an iron factory in New York, which he afterward turned into a rolling mill. In 1845 he removed his business to Trenton, N. J., and built there a new rolling mill, then the largest in the United States, in which were manufactured the first rolled-iron beams for buildings. In 1879 the Iron and Steel Institute of Great Britain fittingly acknowledged his services in developing the American iron trade by awarding him the Bessemer gold medal.

Cooper believed that the great fortune which he built up should be used, to quote his own words, "for the benefit of his fellow men." It was this ideal which inspired him to lend his influence and give financial support to the movement for the laying of the Atlantic Cable, and his liberality has another permanent memorial in the great Cooper Union in New York City (see below). During the financial disturbance following the panic of 1873, he became deeply interested in the Greenback movement, and in 1876 was nominated for the Presidency by the Greenback party.

Cooper Union, established by Cooper in 1859, is an institution where the working classes of New York City may enjoy educational advantages by means of day and evening classes, lectures, reading-rooms, and art and scientific collections. A statue of the founder, by Saint Gaudens, stands near the building.



Photo Brown Bros

PETER COOPER

COÖPERATION, *ko op ur a' shun*. When the first crude savages learned that two men working together could lift a stone which one man alone could scarcely move, industrial co-operation began. But so firmly has mankind held to the distinction "mine and thine," and to the idea that the only way to make *mine* greater is to make *thine* less, that joint labor for mutual benefit has until very recently been classed among the schemes that sound well but are not practical, beyond very narrow limits. In the last year of the eighteenth century, Robert Owen, a British factory owner whose story is told in these volumes, began experiments which proved it profitable for an employer to regard his men as fellow-workers; since his time, coöperation has been successfully introduced into the industrial world in many forms. In general, the word *coöperative* is limited to democratic organizations for mutual advantage in buying, in selling, in borrowing, and in producing, but the coöperative spirit is evident in many other present-day activities.

Consumer Coöperation. One December day in 1844, the dwellers in Toad Lane in the city of Rochdale, England, witnessed the quiet opening of a modest little store whose stock of foodstuffs had been purchased with subscriptions of a few cents from each of its owners. In Great Britain to-day there are many such stores, ranging in size from the smallest of shops to those which do a business of a million dollars a month. Collectively, these stores operate through enormous wholesale societies, which own several factories, farms, plantations in the tropics, and a fleet of ocean-going steamships—all owned by the people who buy the goods, and all the result of the venture in Toad Lane.

The Rochdale plan, almost exactly as outlined by its founders, is the guide not only for the British stores but also for thousands of similar ones in the United States, Canada, and other countries. Its distinctive features are that no member can hold more than one share of capital, and that dividends are paid in proportion to the value of goods purchased, not the amount invested. In England, one share of capital is ordinarily worth five pounds, but to join one needs to pay but a shilling. At the end of the year, this stockholder receives interest on his share, and if he has spent a hundred pounds at the store he will be given back perhaps six pounds of it. At first this will be applied to the sum owed on his five-pound share, but afterward it comes in cash and so reduces the cost of living.

Agricultural Coöperation. This is primarily an agricultural movement that has developed in several different countries as a result of economic policies and management which have worked to the disadvantage of the farmers.

The success of the movement is tangible proof of the conviction of its founders that the farmer receives a better price for his product when he has at his disposal an organized agency to study basic conditions of production, distribution, and consumption.

Agricultural Coöperation in the United States. For several years after the War of Secession, the American farmer had just cause to be dissatisfied. Taxes and interest rates remained high, while the general deflation of currency lowered prices of farm products everywhere. Out of the hardships of this period arose such organizations as the Grange and the Farmers' Alliance, both of which fostered the idea of coöperation as a method of lightening the farmers' burdens. Somewhat later, the Farmers' Union and the American Society of Equity came into existence, and, more influential than any of the foregoing, the American Farm Bureau Federation.

These organizations have emphasized the importance of eliminating waste through co-operative marketing. Herbert Hoover, Secretary of Commerce under Presidents Harding and Coolidge, and who became President in 1929, summarized the problem of waste in the shipment of perishables under seven heads:

1. The waste from needless purchases and sales transactions
2. The waste caused by shipping inferior and unsalable products
3. The waste due to delay and repeated handling.
4. The waste arising from inadequate facilities for handling the products
5. The waste arising from uncontrolled distribution, which causes a surplus in one region and an undersupply in another.
6. The waste from the loss of agricultural capital, as a result of inadequate return.
7. The waste in cost of speculation and hazards in distribution resulting from all the foregoing.

While these forms of waste were considered in relation to such commodities as dairy products, fruits, and vegetables, the advantages of co-operative marketing in the distribution of wool, poultry, grain, tobacco, and cotton are equally outstanding. In general, coöperative-marketing enterprises, when successfully managed, encourage the production of quality products; reduce overhead expenses by increasing the volume of business handled; negotiate the purchase of supplies for farmer members at wholesale prices; do away with disastrous competition; and bring about a better distribution of commodities. All of these results mean a greater margin of profit for the producer and a better grade of product for the consumer.

The earliest coöperative unit to be organized in the United States was the local association. This is an organization of individual farmers living near enough together to use the same shipping center. Usually a local handles one

product, such as grain, livestock, milk, or eggs; or perhaps a group of related products. Several locals in a district or state may combine to form a central marketing organization, of which there are two general types in the United States. The *federated* type is a combination of different local units which have organized in order to secure greater advantages by selling and distributing through a central agency. The local units own the stock, and direct and control the federation. The other type is the *centralized regional* association. It is an organization operating over a considerable territory, sometimes several states. Each member signs a contract to deliver his produce to the local organization with which he is affiliated as an individual. Local organizations, if such there be, are of service in giving the association more elasticity in functioning, but the legal obligations are assumed by the farmer members as individuals. The organization owns the local equipment—warehouses, cheese factories, etc.—and takes charge of the assembling, storing, grading, selling, and marketing of the products. There are about 125 general organizations in the United States, of which fifty are of the federation type, and seventy-five of the centralized type. The rapid development of coöperative marketing on a large scale, which reached its height between 1920 and 1924, was responsible for authorizing legislation in nearly all the states, and for the Capper-Volstead Act, by which the national government legalizes the organizing of agricultural producers.

There have been failures as well as successes, and one of the largest tobacco coöperatives went into receivers' hands in 1926. Nevertheless, the coöperative-marketing movement is established in America on a permanent basis. The total business transacted by the American associations during a fairly prosperous year was estimated to be \$2,500,000,000. The total membership of the coöperatives is approximately 2,700,000, over one-third the total number of American farmers. The grain associations, including farmers' grain elevators, lead with 520,000 members, and are followed, in order, by the producers of dairy products, cotton, tobacco, livestock, fruits and vegetables, eggs and poultry, wool, nuts, and miscellaneous.

There are about 11,500 active local coöperative associations, of which approximately 9,500 operate independently. Some 220,000 farmers compose the remaining 2,000 locals, which are united into federations. The regional associations have a total membership of possibly 900,000.

Coöperative marketing associations extend from the Atlantic to the Pacific, and from the northern international boundary to the Gulf of Mexico and the Rio Grande. In New England

and the North Atlantic states, the coöperatives are mostly local enterprises, with the exception of the dairy organizations. New York State is the center of the largest milk-marketing organization in the world, the Dairymen's League Coöperative Association, a regional coöperative reaching into six states. Connecticut has a state-wide tobacco growers' association. In the South, the cotton and tobacco interests are most effectively organized. The most successful tobacco coöperative is the Burley Tobacco Growers' Association, a centralized organization operating in five states, with Kentucky as a center. Fruits, truck crops, hay, and dairy products are also marketed coöperatively in some parts of the South. In the Central West, the coöperatives are concerned chiefly with the distribution of grain, dairy products, potatoes, and fruits; and the tendency is toward state units. Illinois, the key state for the Middle West, has over 500 livestock associations and over 600 coöperative grain elevators.

The Pacific states lead all other sections of the country in the number of noteworthy, well-managed associations, and in the total value of crops marketed. The growers of horticultural products in California have been especially influential in furthering the growth of coöperative marketing, because of the inspiration furnished by their successful organization and management. The California Fruit Growers' Exchange, handling citrus fruits, is the most successful large coöperative in America, being the outgrowth of an organization that came into existence in 1885. It operates on the federation plan, with local associations that direct the packing and standardizing of the fruit; with district exchanges, composed of locals, that supervise matters in connection with billing and price quotations, and with a central exchange that serves as a clearing house for information on production, consumption, and distribution, and that sells the product. Another noteworthy coöperative, the California Fruit Exchange, which handles exclusively deciduous fruits, utilizes the same selling outlets in the United States as the California Fruit Growers' Exchange (with which it has no corporate connection). Among the other leading California enterprises are the California Almond Growers' Exchange, California Walnut Growers' Association, California Pear Association, California Prune and Apricot Association, Sun-Maid Raisin Growers' Association, Rice Association, and Poultry Producers of Central California. The California coöperatives are noteworthy because they are managed by business men familiar with modern methods of conducting business operations.

In 1926 Congress passed an act creating a Division of Coöperative Marketing in the

Bureau of Agricultural Economics, Department of Agriculture. This division is organized to carry on research, to make surveys, to study the business, legal, and other phases of coöperative marketing, and to dispense information and advisory service. It also has an educational program, but is not given regulatory authority.

The American coöperatives have received more aid than the coöperatives in other countries, notably through the Department of Agriculture (Federal), the state departments of agriculture, the Federal Farm Loan Board, the War Finance Corporation, etc. Yet, in the United States, the farmer is of the same social class as anyone else; abroad, he is a peasant, or an inferior—a distinction of great significance. See LABOR, DIVISION OF.

In Canada. The expansion of coöperative marketing has been later in Canada than in the United States, but the marketing of wheat has taken a rather spectacular form in the organization of large grain pools. During the World War, the government assumed the control of grain marketing, and conducted the enterprise so successfully that after it relinquished control in 1920, the Western wheat farmers decided to profit by this example and do away with grain dealers and board of trade speculators in marketing their crops. Organization of the wheat pools began in 1923 in Alberta. There are now three distinct pools, consisting of sixteen districts in Saskatchewan, seven in Alberta, and seven in Manitoba, each district being subdivided into ten locals. Regina (Sask.), Calgary (Alta.), and Winnipeg (Man.) are the headquarters of the pools, but all three organizations deal with one central selling agency, the Canadian Coöperative Wheat Producers, Ltd., at Winnipeg. This sales organization is chartered by the Dominion government, the separate pools by the provincial parliaments. The farmer members agree to deliver all of their wheat crops, except certain amounts to be used for food and seed, to the central agency, under a five-year contract. A specified sum per bushel is paid, and further payments are rendered after the market price has been established and necessary operating expenses have been deducted. Coarse grains are also being handled by the pools.

There are also successful coöperatives distributing wool, livestock, fruit, honey, and dairy products, though not to the same extent as in the United States. In Canada, however, there is apt to be a closer association between the local governments and the trading organizations. Besides voting grants and loans, the provincial governments sometimes undertake preliminary experiments through the Department of Agriculture.

In Denmark. No other country has applied the principle of coöperation so exten-

sively as Denmark. In this land of prosperous small farmers, it would be difficult to find a farmer who is not a member of at least one coöperative society. The coöperative dairies export more butter than all the dairies in any other country, and return profits to each farmer in proportion to the value of the milk he contributes. The Londoner at his breakfast may have fruit, fresh eggs, and bacon, beet sugar and honey, all with their quality certified by Danish coöperative societies. In a little more than thirty years, coöperation transformed Denmark from a poor nation to one of individuals uniformly prosperous.

Coöperative Banking. If a man of small means needs to borrow money, he will find it difficult, but if several men join together, the affair is made easy. Similarly, a man with a small amount of money to invest is at a disadvantage unless he joins with his neighbors. These are the two maxims upon which the extensive credit coöperation of Germany is based, the system which has been copied by all the countries of Europe and recently by the United States (see RURAL CREDITS). They are the basis, too, of the building and loan societies which in Canada and the United States make it possible for thousands of families to own their homes. E.J.

COOPER'S CREEK, an Australian river formed by the junction of the Thompson and Barcos rivers, rising in Queensland and flowing southwest through the state of South Australia into Lake Eyre, the largest lake in Australia, and one which has no outlet to the sea. Some of the land around Lake Eyre is below sea level and is characterized by low, sandy hills. During the dry season, Cooper's Creek, like the smaller streams in the area, becomes lost in the sand hills, and only a line of stunted gum trees marks the abandoned course. In the rainy season, it becomes a rushing torrent two miles wide. See AUSTRALIA (Rivers and Lakes).

COOPER UNION. See COOPER, PETER.

COOSA, *koo' sah*, **RIVER.** See ALABAMA (Rivers and Forests; The Land).

COOT, *kool*, or **MUD HEN**, a water bird of the rail family, different species of which are common throughout America and in most parts of Europe, Asia, and North Africa (see RAIL). To "come from haunts of coot and hern," like Tennyson's *Brook*, would mean from marshy lakes or quiet, weedy rivers, for it is among the reeds that the coot nests and dives for its food of snails, seeds, fish eggs, and vegetable matter. Though its flesh is not greatly esteemed for food, the coot is often shot by hunters.

It is about fifteen inches long, usually dark slate-colored, sometimes mottled with white; white markings are found on the wing margins and under the tail. Unlike those of true rails, the toes are edged with a peculiar greenish,



CITY HALL SQUARE IN COPENHAGEN

Photo OROG

scalloped membrane. The bill is strong and straight, extending up the forehead and ending in a naked patch. Differing from the coot of



THE COOT

Europe, the American coot has a white bill. This unattractive bird is shy, and it hides in weeds and grasses when alarmed; though awkward on land, it is a graceful diver. D.L.

Scientific Name. The rail family is known scientifically as *Rallidae*. The American coot is *Fulica americana*.

COPAL, *ko' pahl*. See TALLOW TREE; VARNISH.

COPENHAGEN, *ko pen ha' gen*, spelled *Kobenhavn* on European maps, is the capital and largest city of Denmark, and is situated on the eastern coast of the Island of Zealand,

which lies on the west coast of the Baltic Sea. It is the commercial center of Denmark, the outlet for over half its exports; it is also the chief manufacturing center, noted in particular for its manufacture of beautiful porcelain ware. The city lies in the same latitude as Moscow, in Russia, and as cold Hopedale, in Labrador, but the climate is greatly tempered by the Gulf Stream, which enters the North Sea.

Copenhagen, one of Europe's most beautiful cities, contains many interesting and notable places, some of them centuries old. Among its quaintest features are the old gabled houses which line the quay of Nyhavn; another is the spire of the Exchange (Borsen), which was built early in the seventeenth century (1610-1640); this is formed of four great dragons whose heads point in the directions of the compass, while their bodies intertwine until their tails form the top of the spire. There are two world-famous churches—the Vor Frue Kirke contains sixteen magnificent statues executed by the noted Danish sculptor, Thorwaldsen; Frederiks Kirke, or Marble Church, begun by Frederick V in 1740, is noted for its great dome, which rivals in size that of Saint Peter's at Rome. In the Thorwaldsen Museum are more than 300 of the sculptor's works, which he bequeathed to his native city, and here also is his tomb. The Prinsens Palais, once a royal residence, but now a national museum, contains one of the finest ethnological collections in the world. The University of Copenhagen, founded by Christian I in 1478, is one of the oldest in Northern Europe.

The city is the chief center of Scandinavian literature, art, and science.

History. The history of Denmark was once little more than the history of this city; it dates back to 1043, when it was only a fishing village, remaining unimportant until the middle of the twelfth century. As there was a good harbor, the village soon attracted many merchants and was called *Kaupmannahöfn*, or *merchant's harbor*, to which may be traced the present name. It did not become the royal residence and capital until 1443. During the centuries following, the city withstood several sieges. In 1658-1660 it held out against that noted warrior Charles X of Sweden and saved the country from conquest. In 1807 it was bombarded by the English, and part of the city was destroyed by fire. But Copenhagen survives to-day as one of the most beautiful and modern capitals of Europe. It has expanded greatly in recent years; new public buildings have been erected, including a large state hospital, and the harbor has been enlarged and a promenade laid out. Its population is 586,000; with suburbs, 730,000, about one-fifth of the entire population of Denmark. See DENMARK.

COPEPODS, *ko' pe pods*. See HERRING.

COPERNICUS, *ko pur' nih kus*, NICHOLAS (1473-1543), a great astronomer of the sixteenth century, who announced the discovery that the sun is the center of the universe. He therefore gave to the world the basis of modern astronomy. Copernicus was born in Poland. After spending several years in the study of medicine, he devoted himself to mathematics, toward which he had a natural leaning. The study of astronomy soon enthralled him, and he taught mathematics with great success. In 1505 he left Rome, where much of his fame had been gained, and returned to his native country, then entered into Holy Orders, becoming a canon in the Cathedral of Frauenburg, an office he held until his death.

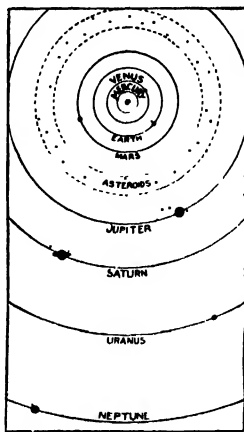
Previous astronomers had held to the Ptolemaic principle, that the earth was the center of the universe. Copernicus doubted the correctness of this conclusion, and his observations confirmed his doubts. His discoveries were not at once given to the world, however. He feared the criticism and hostility of the Church, for a hint of his discoveries had brought forth the accusation that he was

proceeding in a task that was opposed to the Scriptures. When his great work appeared, explaining his theories and discoveries, it was dedicated to the Pope, in the hope of gaining the sanction of the Church. The attitude of the Pope, however, did not affect the astronomer. A few hours after receiving a copy of his publication, Copernicus died, without realizing that he had achieved imperishable fame. See PTOLEMY; ASTRONOMY.

COPLEY, JOHN SINGLETON (1737-1815), one of the most illustrious of the early American painters. He was born in Boston, of Irish parentage, and studied under his stepfather, Peter Pelham, a well-known painter and engraver. Copley gained a reputation by painting portraits of the aristocrats of colonial society, many of which are highly prized by their descendants, because of the rich coloring and dignified and distinguished treatment. His portrait of Mrs. Thomas Boylston, in the Memorial Hall of Harvard University, and that of Mary Storer, in the Metropolitan Museum of New York, are representative of his early work. After 1775 he lived in London, where he began a series of celebrated historical paintings. Among these are the *Death of Lord Chat-*

ham and the *Repulse of the Spanish Batteries at Gibraltar*. In 1783 Copley was elected to the Royal Academy.

COPPER, a metal discovered many centuries ago, in the dawn of civilization, by unknown primitive men. Later, the Greeks and Romans obtained this reddish metal on what is now the Island of Cyprus, in the Mediterranean Sea. The Romans called it *cuprium*, a word derived from *Kypros*, the Greek name of the island.



THE COPERNICAN SYSTEM

It was Copernicus who declared the sun (the heavy inner dot) to be the center of the solar system, and showed that the planets revolve around it. Distances as compared on the above chart are not correct and cannot be made so; the reason is given in the article ASTRONOMY.



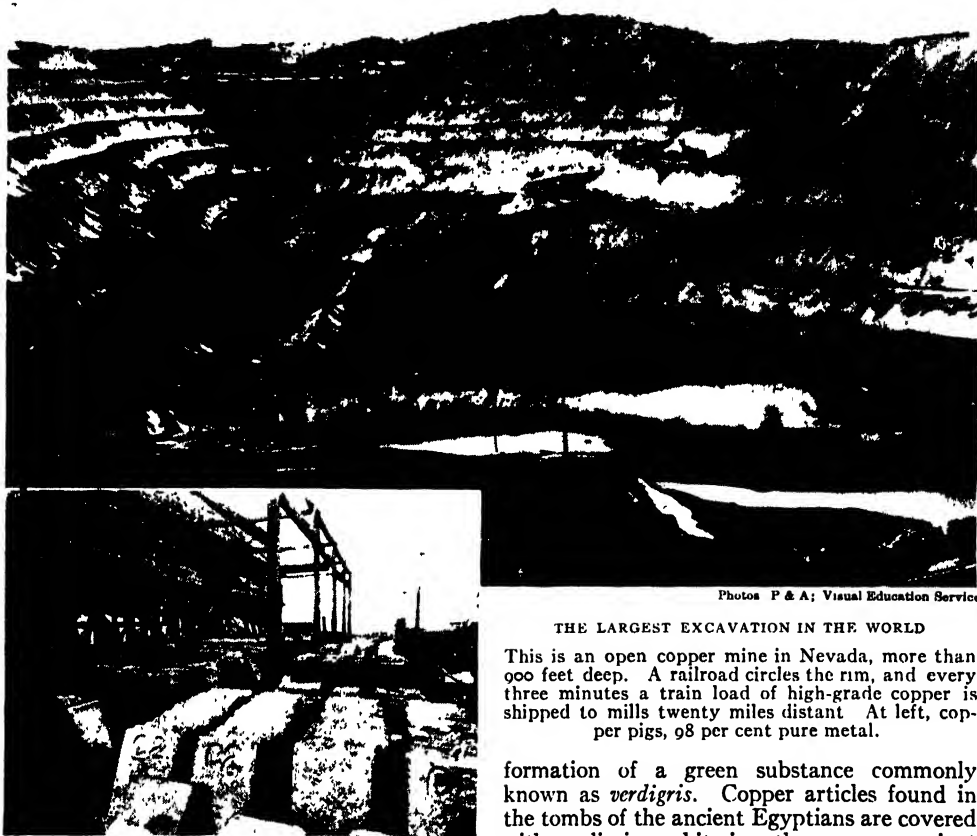
COPERNICUS



Photo: U & U

COPLEY

Photographed from a plaque unveiled in Boston in 1925.



Photos P & A; Visual Education Service

THE LARGEST EXCAVATION IN THE WORLD

This is an open copper mine in Nevada, more than 900 feet deep. A railroad circles the rim, and every three minutes a train load of high-grade copper is shipped to mills twenty miles distant. At left, copper pigs, 98 per cent pure metal.

In later Latin, the word became *cuprum*, and the English name for the metal is only another variation of the same word. The chemical symbol for it is *Cu* (see CHEMISTRY). It is one of the metallic elements. Almost everyone is familiar with copper in some form or other. It is used for the bottoms of wash boilers, for teakettles, and various other household utensils. Copper wire is a common article of commerce, and copper nails and tacks are occasionally seen.

There are three principal ores of copper—native, or metallic copper; chalcocite, a copper sulphide; chalcopyrite, another sulphide.

Copper is one of the metals most extensively used in the arts. It is about nine times heavier than water, melts at 2,000° F., and when cold can be drawn into fine wire and rolled into very thin sheets. It is heavier than iron, weighing seventy pounds more to the cubic foot. It is more elastic than any other metal except steel, and ranks next to silver as a conductor of electricity. It remains bright in dry air and pure water, but when exposed to damp air it turns a reddish-brown, owing to the formation of an oxide, and long exposure to such an atmosphere causes the

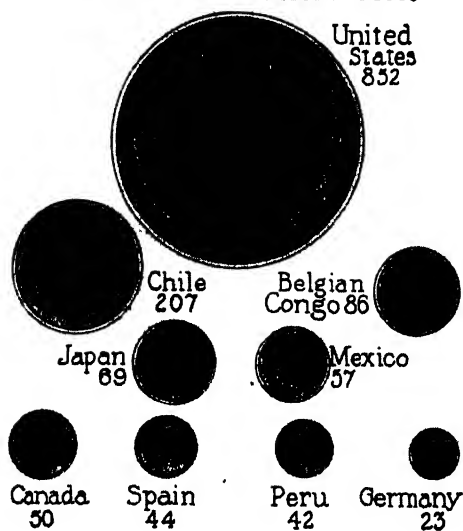
formation of a green substance commonly known as *verdigris*. Copper articles found in the tombs of the ancient Egyptians are covered with verdigris, and it gives them a very ancient appearance. The same effect can be produced in a few hours by the use of acids, and unscrupulous dealers often impose upon tourists, as objects of great antiquity, articles of modern make that have been subjected to this treatment.

Uses of Copper. Besides those already mentioned, there are many other uses to which copper is put. It forms a part of many alloys, as brass, gun metal, bell metal, and various other bronzes. It is used by all nations in making an alloy for small coins, like the American and the Canadian cent, and a small portion is added to silver in making silver coins. It is extensively used in the manufacture of electrical machinery and apparatus, and hundreds of thousands of miles of copper wire are in use for carrying electric current, for light, power, and telephone and telegraph systems. The trolley wires on street-car lines are copper. Its greatest use is due to its electrical conductivity. Over half of the copper mined is used in the electrical industry. It is occasionally used for covering roofs, and is very generally employed in sheathing the bottoms of ships used on the ocean, because salt water will not corrode it. It is also very essen-

tial in making casings for ammunition for the great guns used in modern warfare.

Copper Ores. Copper ores are widely distributed, being found in North America, nearly

Thousands of Short Tons



PRODUCTION CHART

The figures presented are average yield per year for five years.

all countries of Europe, in Japan, Africa, Australia, and South America. One of the world's greatest copper centers is Katanga, in Belgian Congo. The three continents which are the greatest producers are North America, South America, and Africa. In Canada, large deposits of copper ore are found in British Columbia; at Sudbury, Ontario, where it is combined with nickel; and in and about Sherbrooke, Quebec. In the United States is produced more than half of the world's supply. It is found in Keweenaw Peninsula, Mich., in and around Butte and Anaconda, Mont., in Arizona and Utah, and in small quantities in a number of other states, and in Alaska. Contrary to very general belief, Michigan does not lead in copper production, as it once did, but that state produces the best quality of the metal. Michigan has been succeeded as the greatest producer by Arizona, Montana, and Utah, usually in the order named.

The ore supplying the largest amount is *copper glance*. Copper pyrites and copper carbonate are also valuable ores, and usually contain lead and silver. The copper obtained from the Lake Superior mines is in a nearly pure state, and is easily obtained by crushing the rock and separating the metal from it.

There are a number of compounds of copper, not ores, all of which are very poisonous.

Preparation. Most of the ores contain sulphur and more or less rock that has no copper. When taken from the mine, these ores are crushed and concentrated; that is, the copper-bearing portion is separated from the waste by running the crushed ore with water over tables that are in constant vibration. The copper-bearing rock, being the heavier, settles, and the waste is washed away. The ore is then roasted, to drive off the sulphur, after which it is smelted, forming *matte*, which is a mixture of copper and slag. The *matte* is again smelted, and the impurities are thus removed. The metal obtained by the second smelting is known as *blister copper* and is sufficiently pure for ordinary usage. In some works, the Bessemer process is used; this produces blister copper from the ore.

The purest copper is obtained from the blister copper by electrolysis (which see). The process consists in placing a quantity of the impure metal in a tank containing a solution of blue vitriol and a little sulphuric acid and attaching it to the negative electrode, then attaching a small piece of pure copper to the positive electrode, and turning on a strong current. The current dissolves the copper from the mass at the negative electrode and deposits it on the positive electrode, the same as in electroplating, and the impurities fall to the bottom of the tank.

History. Copper has been known and used longer than any other of the common metals.



Photo Visual Education Service

NATIVE COPPER

This mass hangs from the roof of an underground mine.

The Egyptians were familiar with it at least 5,000 years before Christ, and possibly earlier. It is often mentioned in the Old Testament;

tools of bronze are found side by side with those of stone in Europe, in dwellings of a race so ancient that we cannot tell when they lived. When the Indians around Lake Superior were first known to the Jesuit missionaries, they had hammers with copper heads; these tools were the first evidence white men obtained of the existence of copper in this region.

Copper Compounds. Nearly all copper compounds are blue or green in color. The most familiar is the sulphate, which, combined with water, forms large blue crystals, known as *blue-stone*, or *blue vitriol*. When these crystals are heated, the water is driven off, and the uncombined copper sulphate is left as a white powder. If the white powder is allowed to stand in moist air, or if it is dampened, it turns blue again. Some copper compounds were formerly used as blue and green pigments. Chief among these was *Paris green*. All copper compounds are poisonous, and Paris green is doubly so, as it also contains arsenic. Neither it nor any other copper compound is now much used in paint. Copper compounds are often used to kill fungi and insects injurious to plants; thus potatoes are sprayed or dusted with Paris green to poison beetles, seed grain is dipped in copper sulphate solution to kill smut spores, and Bordeaux mixture (made by mixing copper sulphate solution with lime) is applied to grape vines to destroy the mildew, and to fruit trees to rid them of fungi.

T B J

Related Subjects. The reader is referred in these volumes to the following articles

Alloy	Ductility
Arizona	Michigan
Blue Vitriol	Montana
Brass	Paris Green
Bronze	Utah (Mining)
Copper Glance	Verdigris

COPPERAS, *kop' ur as*, also known as **GREEN VITRIOL**, is a compound of iron and sulphuric acid, which occurs in light-green crystals. It has a puckery taste and a somewhat disagreeable odor. When exposed to the air, the crystals absorb moisture and turn a rusty brown. Copperas is extensively used in dyeing fabrics black, in the manufacture of ink, and as a disinfectant. It is made by interaction of iron with sulphuric acid and by treating iron pyrite, a compound of iron and sulphur, with an oxidizing agent (see **OXIDATION**).

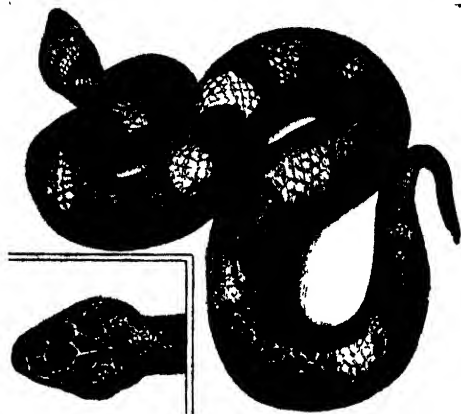
T.B.J.

COPPER GLANCE, a mineral, one of the chief ores from which copper is extracted. It is also known as *chalcocite*, or *vitreous copper*, and is usually found together with another important copper ore, known as *chalcopyrite*, or *copper pyrites*. Copper glance is a sulphide of copper. It has a dark, leaden-gray color, with a metallic luster, which, however, becomes gray or dull when exposed to light. It is soft, and can be easily cut with a knife. Copper glance is found in large quantities at Butte,

Mont., in New Mexico, near the Gila River, in Arizona, and in small quantities near Bristol, Conn. In Europe it is found in Cornwall, England, and in some parts of Germany and Sweden. See **COPPER**. A.N.W.

Chemical Formula. The formula for copper glance is Cu_2S ; that is, a molecule contains two atoms of copper and one atom of sulphur.

COPPERHEAD, a very poisonous serpent of the subfamily of pit vipers, found in the United States from Southern New England



COPPERHEAD

Below is larger detail of top of head.

to the Mexican boundary, below which there are few. It is known by various names, depending on the locality. In the South, it is called the *cottonmouth*; in other places, the *pilot snake*, the *red adder*, the *red eye*, and, incorrectly, the *moccasin*, for its relative, the water moccasin. This snake may grow to be four feet long. Its head is the color of burnished copper, its body light brown or golden, with Y-shaped black marks along its sides, which generally extend to the middle of the back. It lies dormant in winter. A copperhead is more dangerous than a rattlesnake, because it gives no warning rattle, and its bite is usually fatal unless medical assistance is speedily at hand. However, it is a sluggish creature and does not bite unless molested or surprised. See **RATTLESNAKE**.

L.H.

Scientific Name. The copperhead belongs to the subfamily *Crotalinae* of the family *Viperidae*. It is known as *Ancistrodon contortrix*.

COPPER PYRITES, *kop' er pih ri' teez*. See **COPPER GLANCE**.

COPPER STATE, a popular name applied to Arizona (which see).

COPPER SULPHATE, *sul' fate*, the chemical name of blue vitriol (which see).

COPRA, *kop' rah*, the dried meat or kernel of the coconut, one of the principal articles of

export from the Pacific islands. It is valued especially for the oil it yields, which is used in the manufacture of candles and soap. The coconut-stearin, or cake which remains after the oil has been removed from the dried kernel, is used for fodder and manure, in much the same manner as cottonseed-oil cake. When dried in the sun or in a kiln, copra yields from fifty to sixty-five per cent of oil. Dried by hot air, however, often as high as seventy-four per cent has been obtained. The copra of thirty ordinary coconuts will yield a gallon of oil. See COCONUT. E.V.M'C.

COPTS, *kopts*, a group of Egyptians who are Christian descendants of the ancient inhabitants of the country. They live much like other Egyptians, except that they never embraced Mohammedanism. They number about 700,000, and are found mainly in the towns of Upper Egypt, mostly south of Assuan. Saint Mark is honored as the evangelist who led their forefathers into Christianity. The Copts are of lighter color than the Mohammedan peasants, and are not so tall. Their distinctive dress consists of a black coat and a black or blue turban, a garb they were compelled to wear when suffering from Mohammedan persecutions. Though greatly in the minority in Egypt's population, they are intelligent, and they occupy the best clerical positions. C.W.

COPYHOLD. See VILLEINS.

COPYRIGHT IN CANADA AND GREAT BRITAIN. The administration of the copyright law in Canada is under the jurisdiction of the Department of Agriculture, and all communications are addressed to the Minister of Agriculture, Trade-mark and Copyright Branch, Ottawa. Copyright may be secured by any producer of a literary, scientific, or artistic work or composition who is "domiciled in Canada or in any part of the British possessions, or any citizen of any country which has an international copyright treaty with the United Kingdom, in which Canada is included." The fee for securing a copyright is \$1.00, and with the application must be sent three copies of the production, if the same is a book, map, chart, musical composition, photograph, print, cut, or engraving; if copyright is asked for an original painting, drawing, statue, or piece of sculpture, a description of the work must appear on the application blank. The copyright period is twenty-eight years, and the renewal period fourteen. The legal form for the copyright notice, which must appear on the title-page, or the page following, of every copyrighted book, is, "Copyright, Canada, 19—, by (author's or publisher's name)."

The conditions for obtaining a Canadian copyright are as follows: The work must, before publication or production elsewhere, or simultaneously with the first publication or

production elsewhere, be registered in the office of the Minister; such work must be printed and published or produced in Canada, or be reprinted and republished or reproduced in Canada, within one month after publication or production elsewhere. See COPYRIGHT IN THE UNITED STATES (International Copyright).

Great Britain. According to the provisions of the Imperial Copyright Bill which went into effect July 1, 1912, the British copyright may apply to any literary, dramatic, musical, or artistic work, including the delivery of lectures, sermons, and addresses, the dramatizing of novels, the converting of dramas into novels, and the making of any device for reproducing sound pictures. In the 1912 act, architectural drawings were included for the first time. Copyright endures through the lifetime of an author and for fifty years after his death.

Registration was abolished by the Imperial Copyright Act, the publication of a work being equivalent to the securing of a copyright. Publication is defined to mean "the issuing of copies to the public." The act applies to all parts of the British Empire, but may be modified or rejected in those sections which have self-government; namely, the Dominion of Canada, Australia, South Africa, New Zealand, the Irish Free State, and Newfoundland. G.H.L.

COPYRIGHT IN THE UNITED STATES.

A copyright is an exclusive government permit under which authors and artists secure sole right to publish and sell their productions for a specified length of time. Copyright legislation began in the United States in 1790, and in 1909 a law went into effect which amended and consolidated all previous acts respecting copyright. This law, as amended several times by Congress, the last in 1928, provides that the following works may be copyrighted:

- (a) Books, including composite and cyclopedic works, directories, gazetteers, and other compilations
- (b) Periodicals, including newspapers.
- (c) Lectures, sermons, addresses, prepared for oral delivery
- (d) Dramatic or dramatic-musical compositions.
- (e) Musical compositions.
- (f) Maps.
- (g) Works of art; models or designs for works of art.
- (h) Reproductions of a work of art.
- (i) Drawings or plastic works of a scientific or technical character.
- (j) Photographs.
- (k) Prints and pictorial illustrations.
- (l) Motion-picture photoplays.
- (m) Motion pictures other than photoplays.

The law extends to applicants who comply with its provisions the right to print, reprint, publish, copy, and sell the copyrighted work; to translate it or make any other version of it, if it is a literary work; to dramatize it, if it is a non-dramatic work; if a drama, to con-

vert it into a novel; if a musical work, to arrange or adapt it. A model or design for a work of art may be copyrighted and completed later; sermons, lectures, or addresses may be copyrighted before delivery. In the case of encyclopedias, reviews, magazines, and other periodicals, the copyright is vested in the proprietors, as if they were the authors. The publishing of a book includes the setting of the type, the making of the plates, the printing, and the binding, all of which must be done in the United States. If it be not wholly an American product, protection is afforded under the laws governing international copyright (see below).

How Obtained. To obtain a copyright for a work which is to be published, send to the Register of Copyrights, Library of Congress, Washington, D. C., for an application blank. Fill this out and return it with a postal money order or bank draft for \$2.00, and at the same time send two copies of the publication bearing the copyright imprint, which should appear on the title-page or the page following. The prescribed form of the imprint is "Copyright 19— by (author's or publisher's name)." The two copies of the copyrighted work which are sent to the Register are deposited in the Library of Congress.

The deposit of \$2.00 entitles the sender to a certificate of registration under seal. In the case of any unpublished work registered under the provisions of the act, the fee for registration with certificate is \$1.00, and in the case of a published photograph, the fee is fifty cents, where a certificate is not desired.

The copyright secured by the above law runs for a period of twenty-eight years; one year before the expiration of the original copyright, the author, or in case of his death, his heirs, may obtain a renewal for a period of twenty-eight years by making a new application. The copyright ceases when the term of renewal expires.

Penalties for Violation of Copyright. Any person or corporation using copyrighted material without permission and proper credit may be forced to pay penalties, which the courts may make as severe as \$1 for each copy of a book or pamphlet published containing purloined matter. See COPYRIGHT IN CANADA AND GREAT BRITAIN.

International Copyright. By international copyright is meant the arrangement made by different countries whereby books or other prints published in one country may be circulated in another, with copyright protection to the author or owner. Most of the great nations became members of the International Copyright Union by signing the treaty known as the Bern Convention of 1910. A United States copyright extends to the work of a foreign author or proprietor only in case he is domi-

ciled in the American Union at the time of the first publication or if the country of which he is a citizen grants similar copyright protection to citizens of the United States. The President declares by proclamation which countries have copyright relations with the United States. B.M.W.

Related Subjects. For description of protection guaranteed inventors and manufacturers by governments, see PATENT; TRADE-MARK.

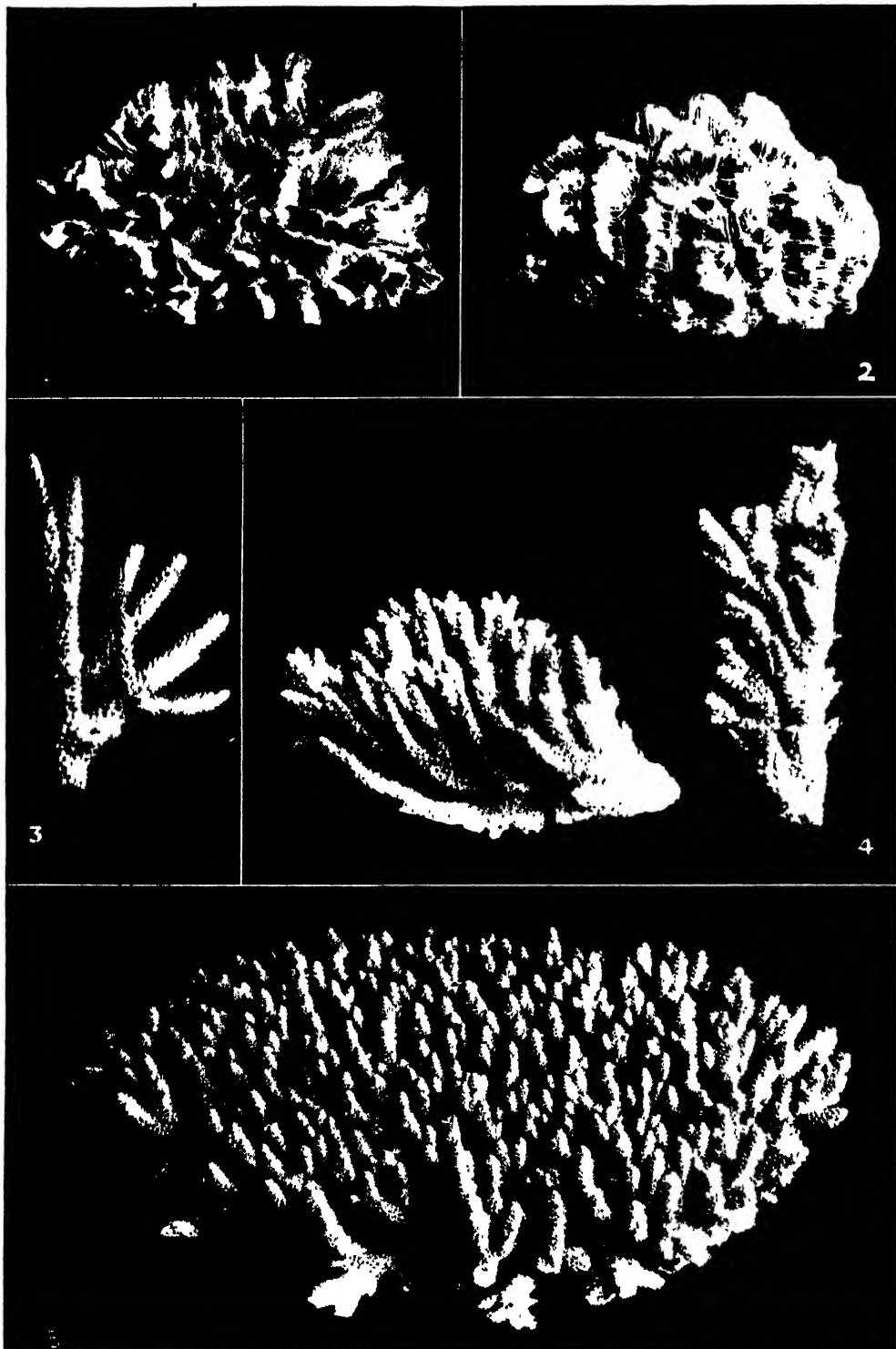
COQUELIN, *ko kla.N'*, BENOIT CONSTANT (1841-1909), a versatile French actor, especially successful in classical comedies, who became popular in the United States through his most celebrated rôle, *Cyrano de Bergerac*, in the play of the same name. He showed dramatic talent at an early age, and was given a course in the Paris Conservatoire. The appealing simplicity of his presentations of *The Marriage of Figaro*, *The Misanthrope*, and *The Barber of Seville* won him wide popularity. In the several visits which he made to the United States and Canada, he was enthusiastically received. His last appearance in America, in 1900-1901, was with Sarah Bernhardt, as Flambeau in *L'Aiglon*.

COQUILLE, *ko kel'*, RIVER. See OREGON (Rivers).

CORAL, *kahr' al*, an animal formation, called a stone, with an interesting history. It is difficult to realize, when looking at an ornament or a necklace made of polished, reddish-pink coral, that it was formed of the shells of multitudes of very small tropical sea animals. Yet this is true. Long ago, when fishermen found this substance in beautiful flowerlike forms, they believed it to be a multitude of sea flowers which hardened when exposed above water, and then scientists investigated further. Now we know that coral is formed by little jellylike animals of the sea called *polyps*, that is, *animals with many feet*.

The animals' organism consists of a central sac or stomach, edged with many tiny feathery arms, or tentacles, with which to anchor themselves to the bedrock of the sea. Subsisting on the sea water, they absorb from it a limy substance which they secrete and build around themselves as a shell. New polyps grow from the parents like buds, and always remain attached to each other. So the process goes on and on until many shapes are formed, the solid skeletons remaining even when the animals which made them are dead. And so billions and billions of families of coral animals build formations as beautiful, substantial, and in some respects as remarkable as man-made cities.

Coral Formations. There are two general classes of coral formations—those of fanciful shapes in white, yellow, pink, red, or black, forming some of the most beautiful sea gardens, and the coral reefs, which are amazing pieces



Photos: Visual Education Service

Coral Formations. (1) Fan coral. (2) Atoll-building coral (see ATOLL). (3) Staghorn. (4) Madrepora, from Singapore, Straits Settlements. (5) Reef-building coral, from Japan.

of animal architecture. Under the former may be grouped the sea fan, the madrepore, or tree coral, the mushroom, the organ pipe, the brain coral, and various flower shapes.

Coral Reefs. In the surging waters of the ocean, where man with his skill and ingenuity has found it difficult, sometimes impossible, to



Photo Visual Education Service

PINK ORGAN-PIPE CORAL

build, this tiny jelly mass, the polyp, has built permanent wall-like structures. There are three classes, formed chiefly by the *anthozoan* polyp, occurring for the most part in the tropical regions of the Pacific and the Indian oceans; the *fringing reef*, the *barrier reef*, and the *atoll*. A fringing reef is a broad bank or platform of coral rock lying near the shore of an island or a continent. There are fringing reefs along the coast of Florida and of the West Indies.

A barrier reef is a large fringing reef, sometimes of vast extent. The great Australian Barrier Reef is 1,250 miles long. But openings usually occur in barrier reefs, caused by the action of fresh sea-water streams on the lime of the coral rock. The outer wall usually rises from great depths but never reaches the surface, because the little marine builders cannot live above or at the surface of sea water. Sometimes lovely tropical islands are found on coral-barrier foundations. The atoll is a ring-shaped barrier within which is a shallow lake. Atolls were probably at one time fringing reefs about an island which later disappeared and remained submerged, while on the reef the little builders continued their work.

Precious Coral. Though all coral formations are curious and interesting, only one, the *precious* coral, is of economic value. This is usually the *madrepore*, or tree coral, which forms in the shallow waters on both sides of the Mediterranean Sea and around its islands. It is either pink or red, is used for jewelry and personal adornment, and is sold chiefly in India. Black coral was once abundant in the Persian Gulf, but is now found chiefly along the Australian Barrier Reef.

Although no coral reefs are found on the American coasts north of Florida, coral is found in shallow waters as far north as New England, but the coral animal will not live in a temperature lower than 68° F. In ancient and medieval times, considerable superstition attached to coral, and medicinal properties were assigned to it. Even now, it is worn in Italy as a charm against the "evil eye."

Related Subjects. The reader is referred in these volumes to the following articles

Atoll Australia (Physical Features) Polyp

CORAL SEA, so named on account of the great number of coral reefs it contains, is that part of the Pacific Ocean which lies between the northeast coast of Australia, the Solomon Islands, and the New Hebrides. The boundaries are indefinite, and the name might well be applied to nearly all parts of the Southern Pacific Ocean. Some of the most remarkable coral formations in the world are found in the barrier reefs which lie along the western shores of this sea. See **CORAL**.

CORBEL, *kawr' bel*, a form of architectural support, first widely used in the Middle Ages. It is a piece of stone, wood, or iron projecting from the vertical face of a wall of a building, to support floor beams, projecting moldings of



CORBELS

doors and windows, or other similar parts of the structure. There are varieties of forms of corbels, and they are ornamented in many ways; in Scott's *Lady of the Lake* is the sentence, "The corbels were carved grotesque and grim." Corbels are especially prominent in Gothic architecture.

CORBETT, JAMES J. See **PRIZE-FIGHTING**.

CORCORAN, *kawr' ko ran*, MOUNT. See **CALIFORNIA** (Surface Features).

CORCORAN ART GALLERY. One of the beautiful buildings in Washington, D. C., located at New York Avenue and 17th Street, N. W., is the home of a famous collection of the finest sculptures and paintings in America. A free school of art is also maintained in the institution. Biennial exhibitions of American paintings of the day add interest to the gallery. Two works of sculpture exhibited there are of

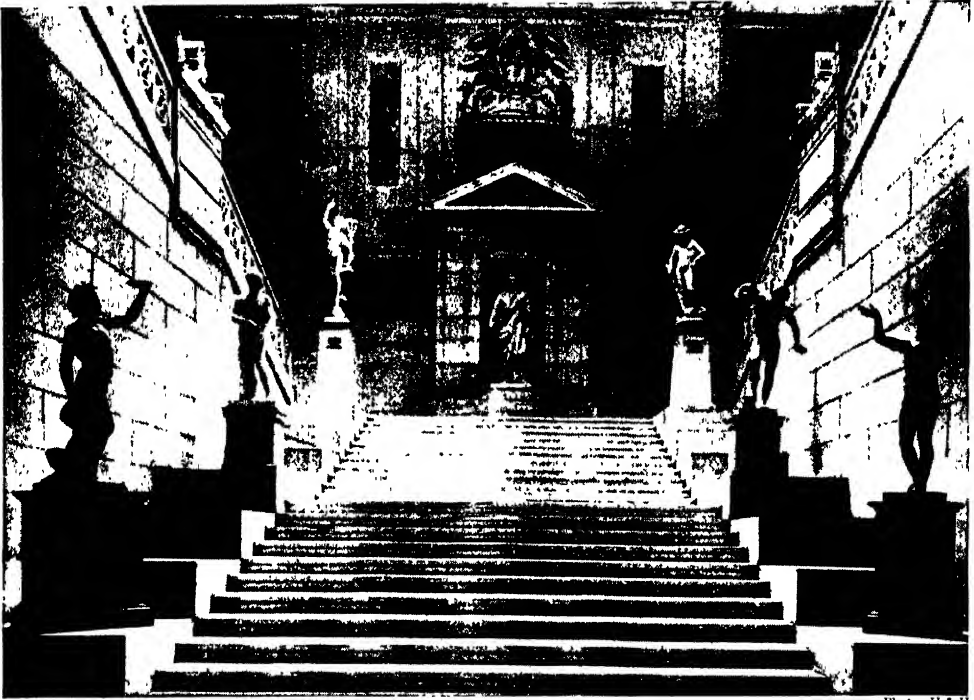


Photo. U & U

STAIRWAY IN THE CORCORAN ART GALLERY

special merit—Powers' *Greek Slave*, of which there are many replicas, and *Dying Napoleon*, the most famous work of Vela. The gallery was founded by William W. Corcoran, and endowed by him with a fund of \$500,000. This has since been increased to about \$1,000,000.

William Wilson Corcoran (1798-1888), a wealthy American banker and philanthropist, was born in Georgetown, D. C., now a part of Washington. From 1828 to 1836 he was the real-estate agent in the District of Columbia for the United States Bank. In 1837 his career as a banker and broker in Washington began, and during the Mexican War he amassed a great fortune. Retiring from business in 1854, he devoted much of his time to philanthropy, and established the art gallery described above.

CORD. See CUBIC MEASURE.

CORDAY D'ARMONT, *kohr deh' dar mahN'*, **MARIE ANNE CHARLOTTE** (1768-1793), was one of the most courageous and contradictory characters of the French Revolution, for she was both a patriot and an assassin. She was born and educated in Normandy, and in spite of her noble birth she found herself completely in sympathy with the people at the outbreak of the Revolution. However, when Marat, their leader, incited them to hideous cruelty and massacres, she became a member of the Girondists, a party which supported neither nobility nor peasantry and was hated by both. She became obsessed with the idea that Marat's

death would mean the relief of France, so she journeyed to Paris, and on the 13th of July, 1793, forced her way into the presence of Marat, who was bathing to relieve a fever which tormented him. Under pretense of giving him Girondist information, she stabbed him. She was condemned to die on the guillotine, and went to her death with the same lack of fear which had marked the planning and execution of Marat's murder.



CHARLOTTE CORDAY
IN PRISON

From a painting by Muller.

Related Subjects. The reader is referred in these volumes to the following articles

French Revolution Girondists Marat, Jean Paul

CORDELE, *kawr del'*. See MISSOURI (Transportation).

CORDILLERA, *kawr dil ya' rah*, or *kawr dil'-ur ah*, OR **CORDILLERAS**, a term somewhat indiscriminately applied to the mountain systems which extend along the western coast of North and South America from Alaska to Cape Horn. The geographical term Cordilleras

now includes the Rocky Mountains, the Sierra Nevadas, and the Coast and Cascade ranges in the United States; the British Columbia and Alaska chains; and the Andes and their connecting systems.

The name is Spanish, meaning a *cord* or *string*, hence its applicability to what is usually called a *chain* of mountains. See **ANDES MOUNTAINS**. R.H.W.

CORDILLERAN HIGHLAND. See **UNITED STATES** (Wealth in the Farms: Irrigation and Dry Farming).

CORDILLERA REAL. See **BOLIVIA** (The Land and Its Rivers).

CORDITE, *kawr' dite*, a smokeless powder adopted as a standard propellant for guns by the British government in 1887. The name has no reference to its composition, but refers to the cordlike shape of the pieces that come from the press. Cordite is composed of nitroglycerin, guncotton, and vaseline. According to the original formula, there were fifty-eight parts of nitroglycerin, thirty-seven parts of guncotton, and five parts of vaseline. This combination proved unsatisfactory, because the high percentage of nitroglycerin caused the development of hot gases that eroded the bore of the gun. The standard British cordite in use to-day has the following composition: nitroglycerin, thirty per cent; guncotton, sixty-five per cent; and vaseline, five per cent.

Related Subjects. The reader is referred in these volumes to the following articles

Ammunition	Guncotton	Smokeless Powder
Explosives	Nitroglycerin	Vaseline

CORDOBA, OR **CORDOVA**, *kawr' do vah*. See **ARGENTINA** (Cities).

CORDOVA. See **SPAIN** (Principal Cities).

CORDUROY, *kawr' du roi*, a strong, thick cotton material, very serviceable for garments for outdoor sports or labor. It has a cut pile, like velvet, but is corded or ribbed on the surface. The name comes from the French and means *king's cord*, because in the seventeenth century the material was used for the outer garments of the king's huntsmen. It is sometimes used for furniture covering and fancy work, but it becomes shabby quickly if given hard usage.

Corduroy road is an expression used in the United States to signify a rough road made by laying logs side by side to cover swampy or marshy places.

COREA, *ko re' ah*, an old form of Korea, now Chosen (which see).

CORELLI, *ko rel' ie*, **MARIE** (1864-1924), an English writer of sensational and melodramatic novels, several of which have been dramatized for the stage and for moving pictures. Little is known of her birth and parentage, except the fact that her mother was Scottish and her father Italian, and that she was born in Venice. In her childhood, Charles Mackay, the poet, adopted her, and she was educated in England

and France. Corelli was at first simply a pen name, but it became her legal name. She lived a life of retirement, and spent her last years in Stratford-on-Avon.

Her Place in Literature. The critics of her day assailed her books for their poor style and melodramatic plots, but she had an amazing popularity, and numbered among her admiring readers Gladstone, Queen Victoria, and Edward VII. Her first novel, *The Romance of Two Worlds* (1886), is a study in spiritualism. Its success was so decided and immediate that she devoted herself thereafter to writing, and produced a large



Photo. Wide World

MARIE CORELLI

number of novels in rapid succession. Among these are *Vendetta*, *Thelma*, *Barabbas*, *The Sorrows of Satan*, *The Master Christian*, *Temporal Power*, *God's Good Man*, *Free Opinions*, *The Treasure of Heaven*, *Holy Orders*, *The Devil's Motor*, *The Love of Long Ago*, and *The Secret Power*, the latter appearing shortly before her death.

CORFU, a Mediterranean island. See **IONIAN ISLANDS**.

CORIANDER, *ko ri an' dur*, an herb of the parsley family, cultivated for its fruit, or seeds. When ripe and dried, these are used as a spice to flavor curries, sauces, and liqueurs, and they are also found in small round candies. By some, coriander is considered a good remedy for chronic indigestion. The plant is native to Southern Europe and the East, and is much more esteemed by Europeans than by Americans and Canadians, the latter preferring caraway. Although the dried seeds of coriander are pleasantly fragrant and sweet to the taste, the finely divided leaves and the stems have a disagreeable odor, suggestive of bugs. The name is supposed to be derived from the Greek word for *bedbug*.

B.M.D.

Scientific Name. Coriander belongs to the family *Apiaceae* (or *Umbelliferae*). Its botanical name is *Coriandrum sativum*.

CORINTH, *kor' inth*, one of the most notable cities of the ancient world, founded in Greece nearly 3,000 years ago. Its situation at the southern extremity of the Isthmus of Corinth, which joins the Peloponnesus, or lower peninsula of Greece, to the northern mainland, made it the most important trading center of the Greeks in the eighth century B.C. It lay between two gulfs, the Corinthian on the west and Saronic on the east, on each of which there was a fine harbor. The city was built to the north and at the foot of a hill 1,886 feet high, a natural citadel more imposing than the famous Acropolis of Athens, and was surrounded



ALL THAT REMAINS OF ANCIENT CORINTH

Of the great ancient city, only a single ruin remains, and it is one of the most interesting relics of antiquity. The original of the illustration was a great temple; seven fluted Doric columns survive, each a single stone twenty-three and one-half feet in height and over seventeen feet in circumference at the base. The Apostle Paul saw its courts frequented by worshippers; from their numbers he drew in part the members of the church he founded. Around this building stretched the streets, mansions, and other temples of a splendid metropolis.

by walls having a circuit of ten miles. Two parallel walls connected the city with its harbor on the west, and a chain of fortifications with the harbor on the east, while across the isthmus a tramroad was built, by which vessels could be hauled from one harbor to the other.

Who founded the city of Corinth is unknown. In the myths of Homer, the place is called *Ephyra*, and it is mentioned as the home of Sisyphus, Bellerophon, and Medea. To its reputation as a great commercial center was added that of one of the wickedest cities of its time, for its wealth and prosperity were a source of corruption to its inhabitants. In art and literature, Corinth ranked below Athens, but the Corinthians were skilled workers in bronze and clay, and their city was adorned with costly statues and paintings. The Corinthian clay vases, with their fantastic decorations, were famous. Most of the temples, shrines, statues, and tombs mentioned by the ancient writers have disappeared, but there still survive seven massive columns of a temple to Apollo, dating from the sixth or seventh century B.C.

As Athens rose to supremacy in Grecian affairs, its increasing importance as a commercial state awakened a spirit of jealousy in the ambitious city of Corinth, and the latter became an ally of Sparta in the Peloponnesian War (which see). Though leagued with other

Grecian states against Sparta in the Corinthian War, between 395 B.C. and 387 B.C., Corinth returned to its former allegiance and aided Sparta in the struggle with Thebes. As the last uprising against Rome had its center in Corinth, the city was completely destroyed in 146 B.C., by Lucius Mummius, the Roman general. A century later, Julius Caesar rebuilt it, and it became the prosperous capital of the Roman province of Achaia.

Saint Paul's missionary labors took him to Corinth (see *Acts* xviii, 1); there he founded a church, and two of his epistles were addressed to the Corinthian Christians. After being twice captured by the Turks and once by the Venetians, and given over to the flames in the Greek Revolutionary War, Corinth was finally destroyed by an earthquake in 1858.

The New Corinth. When old Corinth was destroyed by the earthquake named, New Corinth was founded three and one-half miles northeast of the ancient town. The new city is modern in every way; however, it has attained no great prosperity and has a population of only a little over 6,000. Like Athens, Corinth's greatest charm lies in its traditions.

The Corinth Canal, which connects the Gulf of Corinth with the Saronic Gulf, was begun in 1882 by a French company and completed by the Greeks in 1893. An unsuccessful attempt to construct such a



CORINTH CANAL

As seen from one of its bridges.

canal had been made by Emperor Nero, A.D. 67. The canal is four miles long, seventy feet wide, and twenty-six feet deep. Ships sailing from Adriatic ports to the Piræus, the seaport of Athens, shorten that voyage about 200 miles by crossing through the canal, but foreign steamships usually take the longer route because of the channel's narrowness and the

strength of the current. The canal has at its eastern extremity, the town of Isthmia; at its western, Poseidonia.

B.M.W.



ANCIENT CORINTH

Locations of the city, surrounding political divisions, gulf, isthmus, and famous canal

- | | |
|-------------|---------------|
| (a) Etolia | (d) Attica |
| (b) Phocis | (e) Achaia |
| (c) Boeotia | (f) Corinthia |

CORINTHIAN COLUMN. See COLUMN (The Greek Orders of Architecture).

CORINTHIANS, *ko rin' thi anz*, EPISTLES TO THE, two letters written by the Apostle Paul to the Christian Church in Corinth during A.D. 57. The first was written from Ephesus, probably early in the year, and the second is supposed to have been written from Macedonia some months later. The first Epistle was issued because of dissensions in the church at Corinth and the continuation of certain heathen practices of some of the Christians. In this Epistle occurs Saint Paul's discourse on love, one of the gems of the world's literature. Another celebrated passage in this book is the writer's argument in proof of the resurrection of the dead. The second Epistle is supplementary to the first; it encourages the Corinthians to continue in the faith and warns them against the dangers with which they are surrounded. See PAUL; CORINTH.

CORIOLANUS, *ko ri o la' nus*, a Roman patrician of the early republic, the hero of a well-known legend of that period. In 491 B.C., during a severe famine, he proposed that no grain should be distributed to the common people unless they gave up their tribunes (see TRIBUNE). This suggestion stirred up such a storm of indignation among the plebeians that Coriolanus was banished; he took refuge with the Volscians, the bitterest enemies of his country. Placing himself at the head of the Volscian armies, he led them to the very gates of Rome, refusing to listen to the pleas for peace made by the Roman Senate. Finally, his

aged mother came into his camp, and mingling her entreaties with her tears, prevailed upon him to spare the city.

In Literature. This episode has been immortalized in Shakespeare's drama, *Coriolanus*. See SHAKESPEARE (Synopsis of the Plays).

CORK, the spongy outer layer of bark on a tree known as the *cork oak*. It is composed of the thickened walls of cells whose living contents have disappeared. Cork is light, strong, durable, compressible, and elastic, and neither air nor water can pass through it; it therefore possesses a combination of qualities that makes it one of the most valuable products man has appropriated to his use.

The Tree. The cork oak is a small evergreen tree which grows most abundantly in Spain and Portugal, from which is obtained seventy per cent of the world's supply of the product, amounting to nearly 100,000 tons. Tunis and Algeria are next in importance in production, followed by Southern France and Corsica, Italy, Sardinia, and Sicily, in practically the order named. The tree has been introduced into Southern California and into Mississippi, but the product yielded on American soil is of an unsatisfactory quality. It flowers in April or May, and the fruit, which is an acorn, ripens from September to January, falling to the ground as soon as it comes to maturity. The acorns are fed to swine, to whose flesh they give a specially piquant flavor. Cork-oak trees live 300 or 400 years, but never attain a height exceeding fifty feet. The trunk, however, may grow to a circumference of six feet and more. The botanical name of the tree is *Quercus ilex*.

Stripping the Bark. The time of the first stripping varies in different places from twelve to twenty years after the trees are planted, the first layer removed being a hard outer covering known as "virgin" bark. This, the least valuable part of the plant, is sometimes used as a tanning substance and for making rustic work for conservatories and porches. The second layer is cut off nine or ten years later, and successive strippings occur at the same intervals as long as the tree continues to bear. The best bark is obtained when the tree is from forty to fifty years old. It is from the second stripping that the cork is obtained which is used in making floats for fishing nets; this and the later barkings constitute the cork of commerce.

How the Stripping Is Done. With a long-handled hatchet, the stripper makes a cut around the base of the trunk, and another one at the top, just below the place from which the main branches spring; these circular incisions are then connected by two or more vertical cuts, and the oblong sections of curving bark are pried off with the wedge-shaped handle of the hatchet. Great care is taken not to in-



STRIPPING CORK TREES IN ALGERIA

Photo Armstrong Cork Co

jure the under layer, as on a bruised spot cork never grows again. The harvest season in the cork forests comes in July or August.

How Bark is Prepared for the Market. Cork in its natural state is covered with a rough, woody layer that is scraped off after the slabs have been subjected to a boiling process. Boiling also dissolves tannic acid present in the bark, increases the volume of the cork, makes it more elastic and easier to handle, and flattens it out so that it can be conveniently packed on the backs of burros. These pack animals carry the product to the nearest railway station, from which it is sent to various ports for shipment. Before being loaded on ships, the differing sections of cork are sorted according to quality and thickness, and are then packed into bales and securely bound with steel hoops or wire. The countries which receive the largest amounts of raw cork are the United States, France, and Great Britain. Seville is the most important shipping center.

The Many Uses of Cork. Numerous references in classic writing show that the ancients fully appreciated the value of cork. In Plutarch's *Lives* is the story of a messenger who swam across the Tiber on pieces of cork, a primitive life preserver, and safely reached the

Capitol, which was then besieged by the Gauls (400 B.C.). Pliny says that Roman ladies used cork soles to keep their feet warm; he also mentions the use of the bark for buoys of anchors and fishing nets, and he recommended pulverized cork taken in warm water as a remedy for nose bleeding.

Because of its elasticity, keeping qualities, and the fact that it does not admit air or water, cork is the best substance known for making stoppers for bottles. Cork stoppers, which were first manufactured in the seventeenth century, are now in such general use that they are everywhere known as *corks*, and it is also customary to apply the name to the function and to speak of "corking up a bottle." The lightness, strength, and durability of the substance are utilized in the manufacture of life buoys, belts, life preservers, and other apparatus used in saving people from drowning.

As cork is a poor conductor of sound, it is used to good advantage in making floors for hospitals. *Linoleum* (which see), made by mixing cork powder with linseed oil and spreading the paste over canvas, is an excellent floor covering for offices or halls, for it deadens sound and keeps out dampness. Cork linoleum is now in general use on ships. Cork



Photos U & U; Herbert

THE CORK INDUSTRY

is also occasionally substituted for leather in making sweat bands for hats. Cork molds, covered with silk or cotton, are made by manufacturers of dress trimmings who desire a foundation that is durable and light. Waterproof coats made of a thin sheet of cork cemented between two pieces of silk have come into use. In carpenter shops, bands of cork are used to cover the pulleys over which the band saw runs. Cork is also employed in

making floats for the carburetors of automobiles, wadding for shotgun cartridges, fabric for balloons, a filling for automobile tires, and casks and barrels in which wine is stored. The beautiful and durable Spanish, or cork, black, used in painting, is made from cork parings and waste. See SPAIN (Forests). G.M.S.

CORK, a city in the Irish Free State. See IRELAND (The Cities).

CORM, *kawrm*, a kind of underground stem. It is that part of certain plants like the crocus, cyclamen, and Indian turnip which is often incorrectly called the bulb or tuber. The difference between the corm and bulb is

In the three illustrations above, the camera shows piles of cork which have been put through the boiling process, and in the background other strips which are being boiled; second, a typical scene amid cork trees; and below, a journey to town with a load of cork. The jack appears to be carrying too great a load for comfort, but it is actually not a heavy burden. These views are from Spain.

so slight that it is usually only the scientist who marks the distinction. The corm stores food for the next year's plant in a thick, fleshy stem, whereas the bulb's food is stored in thickened leaves, the tuber's in a thickened rootstock. Like some bulbs, the corm has sheaths or broad scales on the outside, but the principal part is the stem. Many corms are broader than they are high. See BULB.

B.M.D.

CORMON, FERNAND

(1845-1929), a French painter, born in Paris, who achieved world-wide fame for his archaeological subjects. In the Natural History Museum in Paris are ten paintings of this character. At the Saint Louis Exposition (1904), he exhibited some of his work, confined to prehistoric men and animals. They showed rare scientific knowledge. Cormon also excelled as a portrait painter; a canvas of President Loubet of France was one of his best.

CORMORANT, *kawr' mo rant*, a large web-footed bird, known especially for its voracity in eating fish, which it catches by diving. Species of cormorant are distributed all over



Photo: Wide World

A CORMORANT IN A STRANGE LAND

The bird pictured may have flown across the Pacific Ocean, but it is more probable that it escaped from a captor who brought it from Asia. It is shown on parade before a group of children at Santa Monica, Calif., who found it friendly

the world. They live especially on sea coasts, but are often found inland, where they rest on small islands. Among North American

has a long, strongly hooked bill, a long neck, powerful wings, and a rounded tail. The *common cormorant* is black or dark-colored. The double-crested species has bronze-tinted plumage, and a crest of black, curved feathers behind each eye. The pouchlike throat is orange.

In pursuit of fish, cormorants have been known to stay under water a long time, using both feet and wings for swimming. Usually they fly close above the water when watching for their prey, but sometimes they wait, perching on an overhanging branch of a tree. That habit inspired Milton in his *Paradise Lost* to liken Satan to this hungry bird, saying—

Thence up he flew, and on the tree of life,
The middle tree and highest there that grew,
Sat like a cormorant.

Because of its habit of devouring fish voraciously, the cormorant has become emblematical of gluttony, and the name may be applied to a greedy or gluttonous person, to a voracious eater, or an avaricious or rapacious accumulator of wealth. The word is also sometimes used as an adjective, in the sense of ravenous or voracious; thus, Shakespeare speaks of "cormorant, devouring Time."

In the Orient, cormorants have been trained to catch fish for their masters. Especially the Chinese, who have great fondness for fish, use the bird for this task. A piece of hemp or a strap is tied about the neck of the bird to keep it from swallowing the fish, and it obediently swims back to the boat and delivers its catch to its master. D.L.

Scientific Names. Cormorants belong to the family *Phalacrocoracidae*. The common cormorant is *Phalacrocorax carbo*; the double-crested, *P. auritus*.



Photo: Visual Education Service

CORMORANTS AND THEIR NEST

cormorants is the *double-crested* species, which breeds on the ledges of cliffs along the sea. Especially in the Bay of Fundy, the birds have been seen by the hundreds; there, standing almost erect, resting on their tails, they have been likened to "rows of black bottles stood out to dry."

The cormorant is related to the pelican (which see). It is over thirty inches in length,



CORN, the most important cereal grain of the western hemisphere. In the country where it grows most abundantly—the United States—it is regarded as the symbol of the republic's wealth and greatness, for the value of the annual crop is much greater than that of all the gold and silver taken from its mines each year, and the prosperity of thousands of the farmers is due to abundant harvests of corn. The explorers who came to America seeking gold did not know early that they had found a source of wealth far greater than the precious metal they thought had eluded them.

The beauty of the plant has often been praised in poetry, for the fertile farm lands afford no picture more pleasing than a field of corn ripening in the sunshine, with the tall, slender stalks and golden tassels swaying in the breeze. As an emblem of Nature's bounty and of abundant harvest, it has also inspired many poetic tributes; one which is especially attractive is found in the song *Columbia's Emblem*, by Edna Dean Proctor:

Blazon Columbia's emblem,
The bounteous, golden Corn!
Eons ago, of the great sun's glow
And the joy of earth, 'twas born.
From Superior's shore to Chili,
From the ocean of dawn to the west,
With its banners of green and silken sheen,
It sprang at the sun's behest,
And by dew and shower, from its natal hour
With honey and wine 'twas fed,
Till the gods were fain to share with men
The perfect feast outspread
For the rarest boon to the land they loved
Was the Corn so rich and fair,
Nor star nor breeze o'er the farthest seas
Could find its like elsewhere.

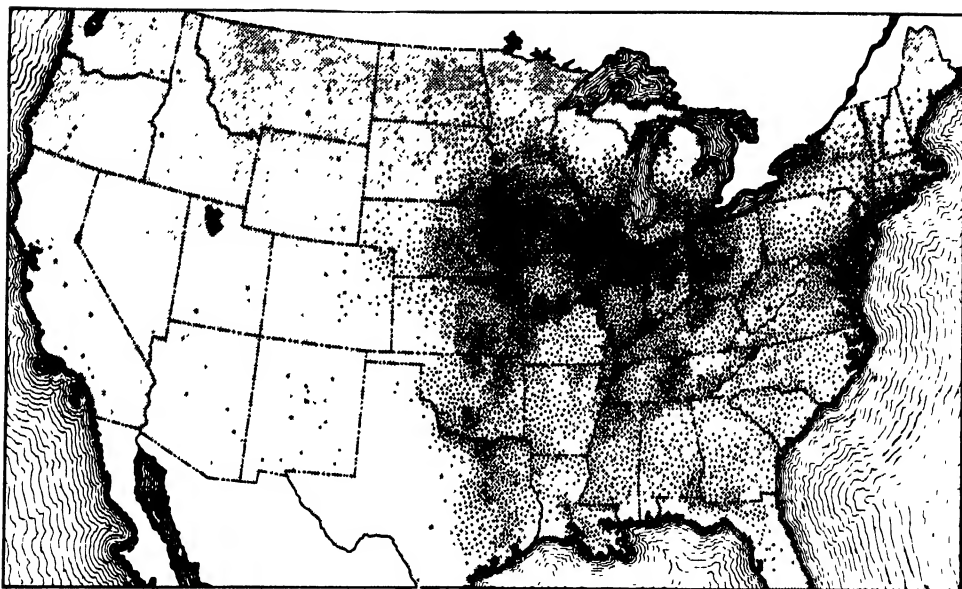
The Name and History. The plant which we call corn was made known to the civilized world only by the discovery of America. Columbus and other explorers found it to be one of the most important elements in Indian life; it was not only food, but part of their religion, and a factor in their trading customs. The native name is *maize*, but because *corn* has always been a general term for *grain* in Europe, the Europeans who first became acquainted with the strange grain of the New World gave to maize the name *Indian corn*. By this latter name, or that of *maize*, it is still known in England. Corn is a generic term in Great

Britain, and includes wheat, barley, and oats (see CORN LAWS). The German word *korn* has a similar significance. The word also occurs in the Bible with varied meanings. In the book of *Ruth*, it is recorded that in the beginning of the barley harvest Ruth went into the fields to glean the ears of corn; in *Judges xv* it is told that in the time of the wheat harvest, Samson burned the standing corn of the Philistines. But in the United States and Canada, the names *maize* and *Indian corn* are applied to the plant much less frequently than is the word *corn*, and the latter term occurs in all government statistics and reports.

Corn is of distinctly tropical origin, while most of the other cereals seem to have originated in the north temperate zone. There is good evidence that the culture of corn began in Southern Mexico at least 2,000 or 3,000 years ago, and spread from there to other parts of North America and to South America. In Mexico there is a native wild plant known as *teosinte*, which can be crossed with corn, thus showing a close relationship. Teosinte has very small, poorly developed ears, but it is altogether probable that corn was developed from it, or from a close relative. By selection, man has developed the fine, large ears and the great number of varieties that are known to-day.

Distribution and Production. The accompanying illustrations show the leading countries producing corn, and their average annual yield in bushels. The United States produces a larger crop each year than all the other countries combined, and its annual production is worth from one to three billion dollars yearly. Canada grows less than 15,000,000 bushels annually, most of it in Ontario, for the grain requires a longer growing season than most of the provinces afford. In the northeastern United States and in Canada, corn is grown largely for silage or for fodder.

Description. Corn is a member of the grass family, and in general appearance resembles the sugar cane. The plant grows from a fibrous root system, producing a slender stalk, or stem, that is concave on one side and varies in length according to variety (see subhead, *Varieties*, below). Important characteristics of this stalk are its division into sections by joints, or *nodes*, its pithy center, wherein is stored the food



AREAS OF GREATEST CORN PRODUCTION IN THE UNITED STATES

needed to ripen the seed, and a thin, compact, outer layer, which serves as a protecting covering. The stalk grows erect and puts forth long, slender, pointed leaves, of a dark green color.

Two kinds of flowers are borne by each plant—male and female. The former, which are at the top of the stalk, bear the stamens and form the *tassel*; the latter, which bear the pistils, constitute the *silk*. The silk grows on a spike (the *cob*), which springs from the stalk in the axil of a leaf. On the cob are rows of seeds (the *kernels*), and there is also a covering of specially formed leaves (the *husks*). The cob and its parts constitute the fruit of the plant, called the *ear*. It is interesting to know that though the ears may have eight, twelve, or more rows, they always have an even number, that there is one silk for each kernel, and that there are, on an average, 800 kernels to an ear.

Varieties. Corn is usually divided into five great groups, according to the character of the grain, as follows: *pop* corn, *flint* corn, *dent* corn, *flour* corn, and *sweet* corn, and there is another variety known as *pod* corn, in which each kernel is enclosed in large glumes, or bulbs. There are more than 500 named vari-

eties of corn, some plants almost reaching a height of as many feet as smaller ones have inches. Certain tall Mexican varieties grow to fifteen feet; while Tom Thumb pop corn grows only two or three feet high. The ears vary greatly in size, also, ranging from two up to twelve inches in length. A plant may produce one ear or several, those usually grown as a forage crop producing two or three small ears



TWO FAVORED VARIETIES
Flint, above; dent, below

Pop Corn is, as its name implies, grown for "popping," which means literally turning the kernel inside out by an explosion caused by heat. Pop corn has small ears, and kernels covered with a hard, strong outer coat. When heat is applied, the moisture in the inside of the kernel generates steam, which gathers force sufficient to burst

the kernel. Other corns are not suitable for popping; they will merely crack and parch. The popcorn industry in large cities is of growing importance.

Flint Corn has a hard, smooth outer coat, and is of various colors, which, in some varieties, is a deep golden-yellow, in others a deep red. The ear has usually eight to twelve rows of kernels, which are very sweet and nutritious. This variety ripens in a shorter season than any other, and is therefore grown farther north than dent corn. The plants usually grow from eight to twelve feet in height

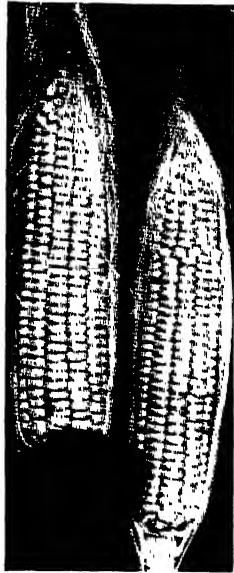
Dent Corn is the ordinary corn of commerce. This variety has an indentation on the top of the kernel, caused by shrinkage of the starchy interior, as moisture is lost during ripening. Dent corn grows large ears, with kernels considerably larger than other varieties. This variety is grown throughout the corn belt of the United States.

Sweet Corn is soft, and shrinks greatly in drying. Containing a larger percentage of sugar than any other variety, with the starchy matter only slightly developed, sweet corn is largely grown for table use, being boiled on the ear. It is also canned in large quantities.

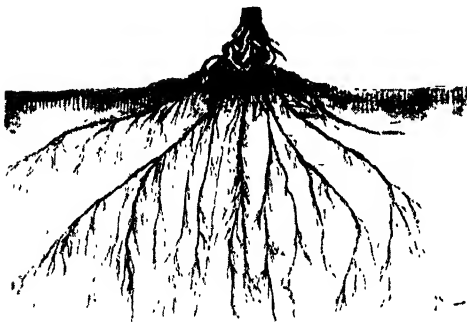
Flour Corn, or Soft Corn, one of the oldest varieties known, has soft, starchy kernels, and is usually grown in the Southern states. This variety is often called *mummy corn*, because it has been found buried in mounds of the ancient Aztecs and Incas.

Culture. If we attempt to account for the enormous production of corn in the United States, it will be found that it is due principally to the ease and cheapness of production, and to its being an intertilled or hoed crop which alternates well with small-grain crops in the practical management of a farm, as well as to the very large amount of feed it produces to the acre.

Corn flourishes in regions of intense sunlight and moist atmosphere. It is not well adapted to a region of semi-aridity, as is wheat. The



PERFECT EARS OF SWEET CORN



HOW THE ROOTS PENETRATE THE SOIL

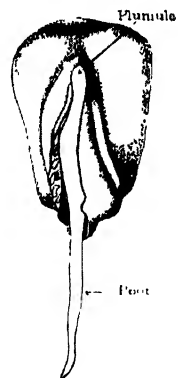
different varieties range from ninety days to about 160 days in their rate of maturing. Those which mature quickly, such as flint corn, are grown in the North, where the season is short.

Corn thrives best in rich, black soil, and may be heavily manured without danger of causing the stalks to break down, as with the other cereals. Where crop rotation is practiced, corn is usually planted on clover or grass sod, while most of the farm manure is also applied to the corn crop rather than to the wheat or to the oat crop. The ground on which corn is to be planted should be carefully prepared; the time of plowing varies with the region, but in general, the plowing should be deeper than for other crops. Far better results are obtained when the corn to be used for seed has been carefully tested for germination. Good seed corn should have a germination of ninety-five per cent.

Corn in the North is grown in rows as close as three feet apart, and in the South up to four and five feet apart. The seed is planted in hills three to four feet apart in all directions, with two or four plants per hill. In the corn belt, the usual custom is to checkrow in hills 3 feet 8 inches apart each way, with two to four plants to the hill. Another method of seeding is by drilling, in which the grains are dropped close together in rows. This method is employed chiefly when the crop is intended for ensilage. Where the soil is loose and deep, the Lister planter is frequently used. This is a combination of plow and planter which opens a furrow into which it drops the corn. It may be used without previous preparation of the soil. Machinery for the planting and culture of corn is well developed, so that practically no hand work need be done from preparing the land to harvesting the crop. However, in regions where the average acreage is small (less than ten acres per farm), the planting, hoeing, and harvesting are still done largely by hand.

After the corn is up, it requires about three to four cultivations to keep down the weeds; after the plants are large enough to shade the ground thoroughly, no further cultivation is given. From the middle of July to the end of August, corn makes its most rapid growth, developing the ears during that period; it is very essential that the weather be hot, with plenty of clear sunshine and with two or three heavy rains.

Corn is ready to be picked or cut and put into shocks to cure about September 15, or if left standing, the ears may be gathered any time after November 1.



SPROUTING CORN

Enemies of the Corn Crop. As in the cultivation of all of his other crops, the farmer must fight insect pests and diseases which attack his cornfields. Rust, leaf blights, and rots cause less damage than does smut, for no effective way to combat it has been found. More than 200 insects attack corn, also. Of these, the chinch bug, which migrates to the cornfields as soon as the earlier small grain is ripe, is the most serious danger. The corn earworm is especially destructive to sweet corn. The third in destructive power in the United States is the European corn borer, which has spread slowly westward and southward from Canada, in spite of efforts to stop its advance.

exclusive diet of stalks and grain, they are fattened for market at a minimum of expense and labor to the farmer. In putting corn into shocks, the stalks should be set vertically, with only sufficient slant toward the common center to make them stand securely. Too



Photos International Harvester Co.

MAKING WORK EASIER

A corn-cutting and loading machine is shown below which cuts and husks the corn and loads the ears into the wagon Above is a machine

much slant makes it possible for the shock to become water-soaked.

The use of corn for ensilage has grown in popularity, and is very common in sections devoted to dairying.

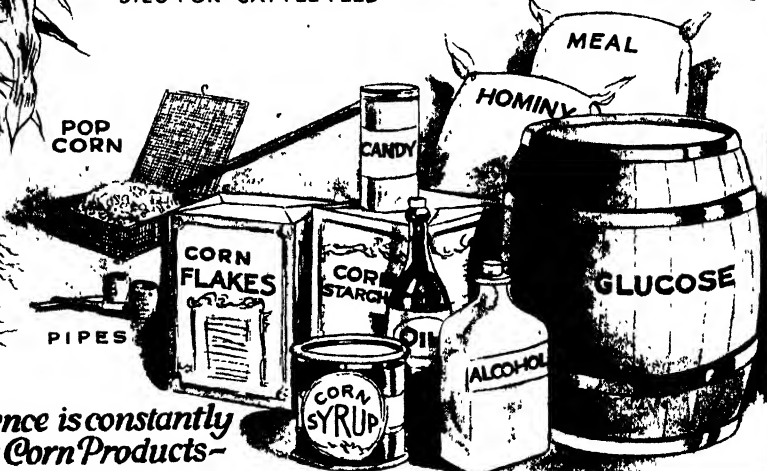
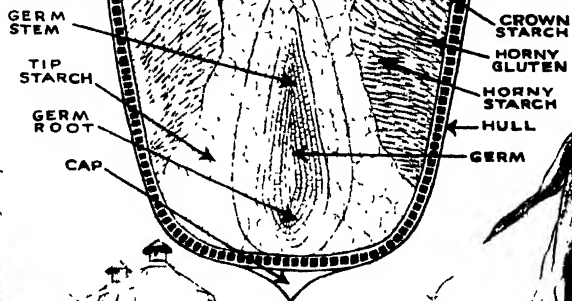
Cost of Production. The United States Department of Agriculture has made a survey of the cost of corn production, and has furnished statistics that should be of interest to the agriculturist. It was found that the necessary expense of producing a crop is nearly as great for a small yield as for one double its size; and that the profits from a field yielding eighty bushels per

Methods of Harvesting. Corn is cut on a small scale by the use of a swordlike blade operated by hand, but on large farms up-to-date machinery is made to perform the labor of harvesting. One type of corn binder cuts, binds, and discharges the standing corn as fast as the horses walk, performing from five to eight times as much work per day as a man would do. Very ingenious picking machines have also been devised, which greatly facilitate the work and also save time. Economical farmers utilize both the stalks and the ears. Since the major portion of corn grown is used for stock feed, a method of harvesting which is being practiced extensively is that of turning stock into the fields of matured corn. Here, with an extra ration which will balance an

acre are over twice as great as those from one producing forty bushels. Therefore, the value of the corn crop will increase in proportion as methods of production improve. Farmers receive the highest returns from their labor who produce the largest crop per acre.

Corn Products. Although rice feeds more people, corn may be regarded as of equal importance, as it yields a larger number of products than rice. Every part of the corn plant has its particular use, and government chemists are working constantly to find ways in which all waste material may be utilized, and new products found in the plant. The stalk, the leaves, the pith, and the fiber, apart from the cob and kernels, all have important commercial

CORN



Modern Science is constantly creating new Corn Products-

PRODUCTS AND BY-PRODUCTS OF CORN

Corn contributes to the welfare of humanity in countless ways. Not only does it appear on our tables in the form of bread, hominy, syrup, breakfast food, and other products, but the beef and pork we eat come from cattle and swine that were fattened on corn. Parts of the corn plant furnish material for the paper we write on or on which we print our newspapers, the starch that stiffens our clothes, the gum on the backs of envelopes, and eraser tips for lead pencils. These are but a few instances of the service rendered by this great cereal. Chemists and industrialists are constantly discovering new uses for it, and every part has value, from the husks to the germ in the kernel. The more important of corn products and by-products are listed below:

Food for Man

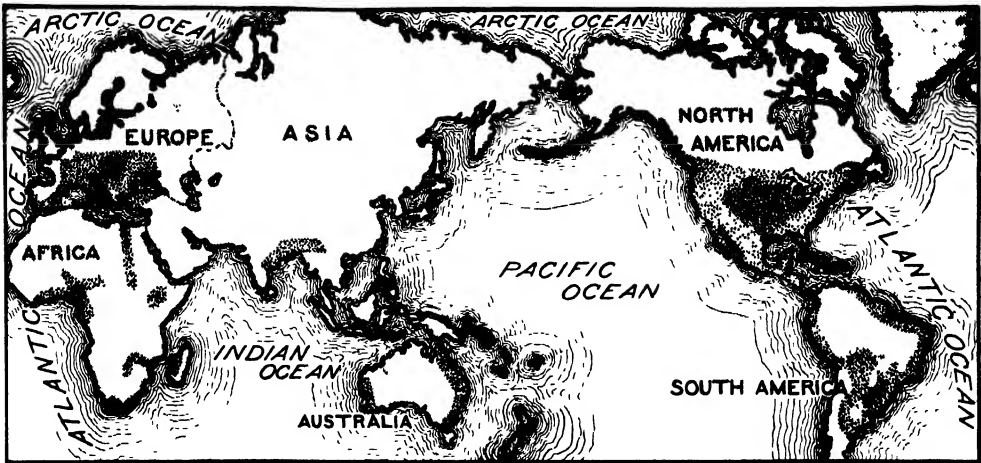
Breakfast foods	Salad oil	Jellies
Cooking oil	Sugar for:	Mince meat
Ear corn	Bread	Preserves
Grits	Infants' and diabetics' foods	Soda fountain flavors
Hominy	Candy coloring, ice cream	Table starch for:
Meal for:	Soda-fountain flavors	Baking powder
Bread	Syrup (glucose) for	Confectionery
Griddle cakes	Baking purposes	Jellies
Mush	Confectionery	Pastes
Pudding	Ice cream	Pie filling
Oleomargarine	Jams	Puddings
Pop corn		Sauces

Food for Stock

Bran	Ensilage	Gluten meal
Cornstalk meal	Fodder	Oil cake
Cracked and shelled corn	Gluten feed	

Miscellaneous Manufactured Products

From the Kernel Oil	From Stalks and Leaves	Laundry starch
Dyes	Mattresses	Leather dressing
Glycerin	Nitrocellulose	Mucilage
Liniment	Packing material	Paper filler
Nitroglycerin	Paper	Shoe polish
Oilcloth	Starch	Sizing
Paint	Acetic acid	Soap
Rubber substitute for	Adhesives	Tanning material
Eraser	Alcohol	Vinegar material
Shoe sole	Cosmetics	From the Cobs
Elastic sponges	Explosives	Label gum
Sizing	Fireworks	Pipe bowls
Soap	Foundry material	From the Silk
Tire filler	Glue	Medicine
Varnish	Ink	



WHERE THE WORLD'S CORN IS GROWN

value. From the cob is obtained a pulp that makes excellent material for stuffing mattresses; the cob also provides pipes which are considered among the best and coolest by experienced smokers. From the pith of the stalks, a paper of good quality is made, and it is also used in the manufacture of guncotton and smokeless powder, and as packing behind the armor plate of battleships. This packing is found very effective; if the armor plate is pierced, the pith swells and stops the resulting leak. It is possible that at no far-distant day the entire stalk will be utilized in the manufacture of paper.

Corn oil, extracted by pressure from the separated germ sections of the corn, is used for butter substitutes, cooking and salad oils, glycerin, soap, varnishes, and for a rubber substitute in making sponges, eraser tips on pencils, and other rubberoid products. After the oil is pressed out, the residue is sold as stock feed, called corn-oil cakes or germ meal. Gluten feed and bran are made from the gluten content and the hulls. Many millions of bushels of corn are annually made into starch, both for food and for laundry purposes. Starch may be further modified and made into glucose, which is widely used in the manufacture of confectionery, preserves, and jellies. *Alcohol* in great quantities is made from corn by distillation, a bushel producing more than two gallons of ninety-five per cent pure spirit (see subhead *Coming Uses for Stalks*, below). The gum, or adhesive mixture, used on the back of United States postage stamps is *dextrin*, also a product of corn and used, as well, in the manufacture of glue. The leaves of the corn plant are employed for packing fruit and making mats; and in the corn belt and other districts where the expense of hauling coal is great, corncobs provide a considerable part of

the family fuel, three tons of cobs being equal to one ton of hardwood.

Of the corn raised in the United States, more than four-fifths is used for stock food on the farms producing it, corn being both a cereal and a forage plant. About thirteen per cent of the crop is utilized in the manufacture of hundreds of different products. Corn-meal mills take the largest part of this amount, while the starch factories consume the next largest portion for starch and all of the products made from it. The amount exported is only one or two per cent of the total, while the corn

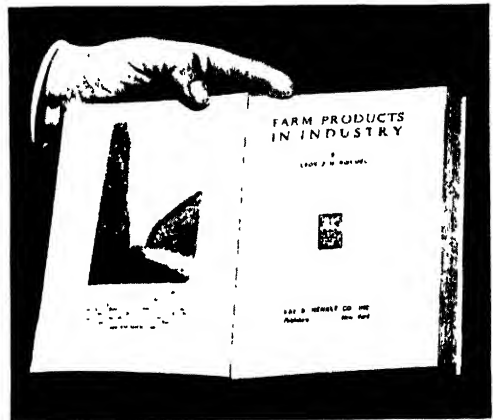


Photo Keystone

MADE OF CORNSTALKS

This is a photograph of the first book ever published which was printed from paper made from cornstalks. Very appropriately, it bears the title *Farm Products in Industry*.

consumed in towns and cities, except when used in manufacturing, is only two per cent of the total crop.

Coming Uses for Stalks. Chemists announce that every hundred pounds of cornstalks can

be made to produce slightly more than one gallon of alcohol. In not harvesting his stalks for such economic use, the farmer, where a market is not too distant, allows a great deal of wealth to go to waste. One acre of ground yields ten to twelve tons of stalks, or the equivalent of 1,200 pounds of alcohol, or 200 gallons. If all the alcohol possible were derived from the nation's cornstalks, it would be possible for alcohol to compete with gasoline as a fuel. The United States Department of Agriculture declares that the alcohol so derivable would run all automobiles, trains, and steamboats, would heat and light all houses, and illumine the streets of every city.

It has been demonstrated that experiments already extending over several years will result in developing a cheap process of making printing-paper from cornstalks, and make it a common satisfactory substitute for the wood

with a fuel value of 1,685 calories per pound. Pop corn has a value of 1,875 calories per pound; corn cereals, 1,680 calories; and parched

corn has even a higher value, 1,900 calories per pound. The average home-cooked corn biscuit has a value of 1,920 calories per pound. Green corn boiled in the ear possesses little of the food value of the flour preparation, giving only 550 calories per pound (see CALORIE; FOOD).

Boys' Corn Clubs.

The boys' corn-club movement in the United States is an outgrowth of the Farmers' Co-operative Demonstration Work, inaugurated in 1904

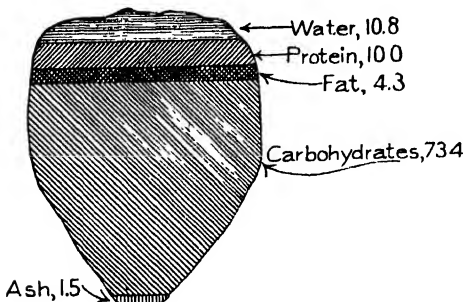
under the auspices of the United States Department of Agriculture. In recent years, the importance of awakening in the boys an interest in farm life and its problems has been widely realized, and this movement originated in the desire to create such a love for rural life that the number of youths who yearly left the country for the cities would be greatly



Photo U U

BALES OF CORNSTALKS

These two great piles of stalks, solidly packed in bales, are awaiting industrial uses. They will be made into "silk" hosiery, paper, and other commodities requiring cellulose. The photograph was taken in Eastern Illinois.

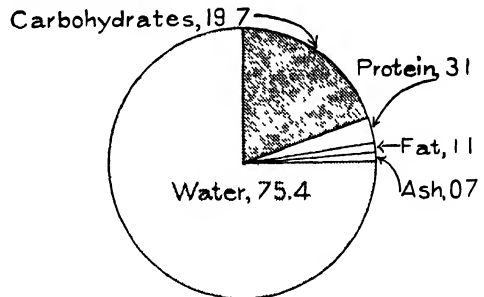


COMPOSITION OF DRIED CORN

which now feeds the paper mills. Chemists predict that soon cornstalk gas will be available for heating and for running automobiles.

Food Values. All varieties of corn are very nutritious. A mixture of rye and corn meal makes excellent bread; corn-meal porridge is nourishing; corn-meal biscuit, called locally "johnnycake," is the delight of many families.

As human diet, all preparations of corn flour have high food value. The composition of dry corn is about ten per cent water; ten per cent protein; 73.4 per cent carbohydrates,



COMPOSITION OF GREEN CORN

diminished. The work was definitely organized in 1909, and at the present time the enrollment in the clubs of the various corn states is about 55,000.

The corn-club work is managed by the demonstration workers, the county superintendents of public instruction, and the rural teachers, and the boys follow the directions and instruction given in the circulars and bulletins sent out by the United States Department of Agriculture, under the personal supervision of the demonstration workers. The superintend-

ents and teachers organize the schoolboys over ten years of age into clubs; the parents furnish land, teams, and tools; public-spirited citizens in the community provide the prizes;



CORN-CLUB MEMBERS

In a Maryland county, the county agent is instructing two boys in the details of selection of seed corn.

and the publicity work is taken care of by the local papers. The boys follow a uniform plan in all their work.

The general plan is to have each boy cultivate one acre of corn, thereby becoming a

- (3) Best exhibit of 10 ears at county, district, or state fair 20
 (4) Best written history or account, entitled "How I Made My Corn Crop" 20

Total score 100

The prizes include free trips to fairs, educational institutions, and state corn shows, land, farm implements, thoroughbred farm animals, banners and pennants, tools, poultry equipment, camping outfits, books, subscriptions to magazines, etc. Probably the most desirable

Figures Represent Millions of Bushels



LEADING COUNTRIES

In the production of corn. The figures represent an average production for four years.

awards in the eyes of the boys are the free trips to Washington, D. C., but scholarships in agricultural colleges are also highly prized.

The practical benefits resulting from the corn-club movement are eminently worth while. In 1910 Secretary Wilson publicly stated that he gave the boys' corn clubs a considerable degree of credit for the great increase in the production of corn in the South during that year. The boys find in their acre of land a laboratory where they gain practical information about soil building, selection and testing of seed, cultivation of the grain—in fact, everything pertaining to the growing of corn. They acquire a love for the soil and an appreciation of the importance of agriculture as an industry. They develop habits of close observation, accuracy, and systematic application, and they learn to rely on themselves and to adapt themselves to emergencies.

The contests stimulate in these boys a wholesome spirit of competition, and at the same

Figures Represent Millions of Bushels



LEADING AMERICAN STATES

In corn production. The figures represent an average production of four years

competitor for various prizes. The state, district, and county championships are determined on about the following basis:

- (1) Greatest yield per acre 30
 (2) Best showing of profit on investment 30

OUTLINE AND QUESTIONS ON CORN

Outline

I. Name and History

- (1) *Maize*, or *Indian corn*
- (2) Introduction in Europe
- (3) Origin in tropical countries
- (4) The wild *teosinte* of Mexico
- (5) Adaptation to northern latitudes
- (6) Widespread growth

II. Varieties

- (1) Pop corn
 - (a) Peculiarities
- (2) Dent corn
 - (a) Commonest variety
 - (b) Great production in United States
- (3) Flint corn
 - (a) Grown farther north than other varieties
- (4) Sweet corn
- (5) Flour corn
- (6) Size of plants and ears

III. Method and Cost of Production

- (1) Manner of planting
- (2) Of cultivating
- (3) Most favorable soil and weather conditions
- (4) Method of harvesting
- (5) Cost of production
 - (a) Small increase in cost with increased production per acre

IV. Importance of Corn

- (1) World's crop
- (2) Where chiefly grown
 - (a) United States greatest producer
 - (b) The "corn belt"
- (3) Varying uses
 - (a) As food
 - (b) As forage
 - (c) In paper-making
 - (d) In manufacture of alcohol
 - (e) In rubber-making
 - (f) Miscellaneous uses

V. Food Value

- (1) Of corn flour
- (2) Of green corn

VI. Corn Clubs

- (1) Purposes
 - (a) To diminish trend from farm to city
 - (b) To teach new and better methods
 - (c) To introduce corn-production in new territory
 - (d) To vitalize work in rural schools
- (2) Method
 - (a) Competition
 - (b) Special instruction

Questions

What makes pop corn pop?

Is there any difference in the method of planting corn intended for ensilage and that grown for the ears alone?

How much alcohol could be manufactured yearly if all the cornstalks of the United States were used in its manufacture?

Have you ever counted eleven rows of corn on an ear? Are you ever likely to?

Which has greater food value, "corn on the cob" or corn bread?

How much time is required for corn to mature?

Which is the correct style of corn shock, that with a broad base and very sloping sides, or that which has almost vertical sides and a narrow base? Why?

What other common plants belong to the same general order as corn?

How large a proportion of the United States corn crop is used as forage?

If you spoke in England of *corn*, what misunderstanding might arise? How could you prevent this?

What is the ordinary corn of commerce called, and why?

If you had a sandy field, and one with a rich black loam, which would you choose for your corn?

What are the three greatest corn-producing states in the American Union?

How does Argentina's production compare with that of the United States?

time widen their interests. The social side of life is cultivated by rallies and other meetings; the bond between the boy and his home is greatly strengthened, because he is doing something that is of vital interest to the family. More than this, the work of the clubs is being more and more correlated with the work in the rural schools, resulting in a vitalizing of the course of study and the creation of a greater interest in school activities. T.L.L.

Scientific Names. Corn belongs to the grass family, called *Gramineae*. The species name is *Zea mays*.

Related Subjects. The reader is referred in these volumes to the following articles

Boys' and Girls' Clubs	Glucose
Chinch Bug	Seeds (Testing)
Corn Borer	Silo and Silage
Corn Earworm	Smut
Food	Starch

CORN, a small area of hardened, thickened skin, resulting from continued rubbing. The usual site of corns is over the joints of the toes. In such locations, the corn protects the underlying soft parts and the joint. A soft corn is a corn between the toes. Such corns are soft because the hard, thickened skin macerates and wears away. Corns on the toes result from wearing shoes which rub the skin unduly in certain locations. Corns can be removed with corn plasters or corn remedies. These latter consist of salicylic acid dissolved in collodion. After a few applications of salicylic-acid collodion, the dead tissues can be pried out with a dull knife blade. However, if the shoes continue to press and rub the area, thickening of the skin will recur. Great care should be exercised in trimming corns with knife and scissors, lest infection result.

The men and women who specialize in the care of the feet, including the prevention and removal of corns, are known as chiropodists. W.A.E.

[The well-known complaint about corns hurting in damp weather has a basis of fact. Most leather absorbs moisture from the air, and consequent shrinking causes the shoe to pinch the tender spot.]

CORNARO, *kawr na' ro*, COUNT. See LIFE EXTENSION.

CORN BORER, an insect pest introduced into America in shipments of broom corn from Hungary or Italy. It is more correctly called **EUROPEAN CORN BORER**. In 1917 it was discovered in the sweet-corn region of Eastern Massachusetts, and later in Ontario, north of Lake Erie, and in New York, Pennsylvania, Ohio, and Michigan. By the close of 1926, it had become established in Illinois and Indiana, and was generally recognized as a serious menace to the corn crop of the Middle West.

Description and Life History. The borer is the larva of a species of night-flying moth,

and is a brownish worm about an inch long (see LARVA). The borers pass the winter in the stems of plants, from which, as fully developed moths, they emerge early in June.



CORN-BORER TERRITORY

The areas in black show the extent of the borers' migration. More than 90,000,000 acres of corn land have been affected.

The females lay small clusters of eggs on the leaves of plants to be attacked, and the larvae, as soon as they are hatched, bore their way into the plant stems, where, in about six weeks, they develop into moths. The moths, emerging in July, soon produce a second brood of larvae, and it is these larval borers that destroy the stalks and ears of the maturing corn plants. In the vicinity of Lake Erie, however, there is apparently but one generation a year, while in New England there are two broods each season. Though the borers prefer corn and sorghum, they readily attack numerous other large-stemmed plants, such as celery, potatoes, tomatoes, and dahlias, as well as many weeds.

Control. The menace of the corn borer has become a national problem, and in 1927 Congress appropriated \$10,000,000 for a clean-up campaign, in an effort to prevent its further spread. To combat the larvae in their winter quarters, it is necessary to destroy, shred, or convert into silage the entire stalk of the corn plant. State officials are everywhere working in coöperation with the Federal Department of Agriculture. The following measures are specifically recommended by the department:

1. Destruction, before May 1 of each year, of all cornstalks, cobs, corn stubble, weeds, large-stemmed grass, and remnants of vegetable, field, and flower crops likely to be the winter quarters of the borers.
2. Removal of sweet-corn fodder from the field as soon as the ears are harvested, and of field corn as soon as the ears are mature.
3. Plowing under to a depth of six inches or more during the winter of corn stubble and other remnants when it is impractical to destroy them by burning or other method.
4. Planting of early sweet corn to act as a trap crop adjacent to the fields intended for field corn or late sweet corn. (Such planting must be utilized or destroyed early.)

Other measures include the importation of parasitic insects to prey on the borers. Ma-



Photo U S Department of Agriculture

HOW THE CORN BORER WORKS

At left the illustration shows how the borer destroys the stalk. Below are the butterflies, which, when mature, travel to the next point of attack. At right, ears of corn showing the ravages of the borer.

chinery has been perfected which picks and husks the corn and shreds the remnants for silage or immediate return to the soil. Such devices are proving successful against the borers in many localities. Strict quarantine lines have also been drawn around infested areas. W.J.S.

Classification. The scientific name of the corn borer is *Pyrausta nubilalis* Hübner.

CORN CLUBS. See CORN (Boys' Corn Clubs); BOYS' AND GIRLS' CLUBS.

CORN CRAKE. See RAIL.

CORNEA, kawr' ne ah. See EYE.

CORN EARWORM, also called **BOLLWORM**, the worst insect attacking sweet corn, and an injurious pest of field corn, tomatoes, cotton, alfalfa, and other garden and field crops. The adult is a buff-colored moth; the larva, which is the destructive form of the insect, is a dark-striped greenish-brown worm, or naked caterpillar, about an inch and one-half long. In the latitude of Kentucky, there are usually three broods, hatching successively in June, July, and August. On corn, the last brood do the most damage, for these worms eat the

maturing ears. The larvae damage the leaves of cotton plants, and also tunnel their way into the bolls.

Fall plowing of corn and cotton fields helps to check these pests by destroying the pupae. In the case of corn, it is advisable to plant early, that the plants may develop beyond the silking stage before the moths come out to lay their eggs. Dusting powdered arsenate of lead on the silks of sweet corn and on cotton leaves, at hatching time, will reduce the injury, but is not practical in the production of field corn. W.J.S.

Classification. The corn earworm is classed as *Heliothis armigera*. It belongs to the moth family *Noctuidae*.

CORNEILLE, kawr na' i, PIERRE (1606-1684), known as the father of the French classical tragedy, a domain in which he has possibly been equaled, but not surpassed. Born in Rouen, he was admitted to the bar at eighteen years of age, but his poetical instincts led him away from the legal profession. In 1629 his first comedy, *Mélite*, was played in Paris,

where it met with great success. Seven years later, *Le Cid*, his first great classical drama, was produced. From 1629 to 1674, Corneille wrote thirty-three plays, eighteen of which are tragedies, and the others consist of lyrical operas, tragedy-ballets, and comedies. In his day, public taste demanded heroic men and deeds and extraordinary adventures, and his great inventive powers were applied to creating situations for the manifestation of heroic energy.



Photo Brown Bros.

CORNEILLE

CORNELIUS, *kawr na' le oos*, PETER VON (1783-1867), a German painter, whose work was of importance because of its influence on the development of modern German art. In 1811 he went to Rome, where he formed an association with Overbeck, Veit, and others of the "Nazarene painters," so called because of their devotion to Christian art. They were asked to decorate a room in the house of the Prussian consul, and in so doing revived the long-neglected art of fresco painting (see *Fresco*). Returning to Germany, Cornelius made the designs for the celebrated frescoes in the Museum of Sculpture at Munich, and in 1825 became director of the Munich Academy and was ennobled. Later, he painted the colossal *Last Judgment*, in Ludwig's Church, Munich.

CORNELL, *kor nel'*, **UNIVERSITY**, one of the largest universities in the United States, located at Ithaca, N. Y., coeducational since 1872. It was founded to carry out the ideal of Ezra Cornell, who, in offering \$500,000 as an endowment fund, made the memorable statement, "I would found an institution where any person can find instruction in any study." Cornell was thus the first of the universities to recognize the more plainly practical needs of students, without neglecting classical ideals. To Mr. Cornell's fund were added the proceeds from the sale of public lands granted New York by the Federal government, and the university was incorporated in 1865 and formally opened three years later.

The campus of Cornell is one of the most beautiful in the world. It is situated on a hill overlooking Cayuga Lake, and commands a view of a picturesque valley, beautiful cascades, and deep gorges cut by Fall and Cascadilla creeks. A playground and athletic field of fifty-five acres lies to the east of the campus, and on the waters of Cayuga Lake the famous Cornell crews practice for the great university rowing contests.

Among the large number of departments of the university, special mention should be made of the College of Agriculture, one of the strongest schools of its kind in the United States, and the New York Veterinary College. The College of Medicine is partly located in New York City, and in 1928 was merged with the New York Hospital, occupying for joint operation a new building completed in 1930, close to the Rockefeller Institute for Medical Research in New York City. The enrollment in the university is about 8,000; the faculty numbers nearly 1,100 members.

Ezra Cornell (1807-1874), the liberal-spirited founder of the university, was born in Westchester County, N. Y. He received only a common-school education, and early in life worked as potter, carpenter, and mechanic. In 1826 he removed to Ithaca, N. Y., where for eight years he managed a flour mill. Becoming interested in the construction of telegraph lines, he invented a machine for laying the wires underground; when this proved impracticable, he made the suggestion that the wires be strung overhead. This plan was successful, and it is still followed. In 1855 he helped found the Western Union Telegraph Company, and it was in connection with telegraphy that his large fortune was acquired. The public library of Ithaca, as well as the great university is a memorial of his generosity.



Photo U & U

EZRA CORNELL

CORNET, *kawr' nel*, or *kawr nel'*, a wind instrument belonging to the same family as the trumpet. The cornet is between the trumpet and bugle in size. It has a penetrating tone and is adapted to the production of trills, rapid runs, and other embellishments, qualities which account for its popularity as a solo instrument. The cornet is a tapering brass or silver tube of narrow bore, about four and one-half feet in length, curved upon itself, and provided with a cup-shaped mouthpiece. The other end is a flaring bell. Piston valves, usually three in number, which open up additional sections of tubing, effect alterations of the notes by lowering the pitch. The compass of the cornet is about two and one-half octaves. The instrument is more easily mastered than the trumpet, and its effects are more spectacular, but conductors of orchestras do not always permit its use. In the brass band, however, it is considered indispensable. See **TRUMPET**; **BUGLE**.

CORNFLOWER. See **KAISER-BLUME**.

CORNING, N. Y. See **NEW YORK** (back of map).

CORN LAWS, in English history, the name applied to laws, dating back to about 1360, in the reign of Edward III, passed to regulate the trade in grain. In England, wheat or any other grain used for food is called corn, and the name does not refer to maize, or Indian corn. In the early period, laws were passed forbidding farmers to ship their grain out of the country, the object being to prevent a scarcity of the supply necessary for home use. Later, duties were placed on grain imported into England, and these had become very burdensome by the time of Queen Victoria's accession to the throne in 1837, for they raised the price of food and worked great hardship to the poor people.

About 1839, an anti-corn-law movement was started; the agitation was carried on for several years, aided by the zeal and eloquence of John Bright and Richard Cobden, and by a crude poet, the "Corn-Law Rhymer," who stirred the people with such lines as these:

England! what for mine and me,
What hath bread tax done for thee?
Cursed thy harvest, cursed thy land,
Hunger-stung thy skill'd right hand.

Finally, Sir Robert Peel, the Conservative Prime Minister, yielded to the popular outcry, and in 1846 Parliament repealed the unpopular corn laws, an event which marked the beginning of England's policy of free trade



Photo Brown Bros
LORD CORNWALLIS

CORNWALLIS, *kawrn wahl'* is, CHARLES, Marquis (1738-1805), one of Britain's ablest generals in the Revolutionary War in America,

but who was finally outgeneraled and compelled to surrender at Yorktown on October 19, 1781. In England, at the outbreak of hostilities, he openly expressed his opposition to the war, but sailed to assume command in com-

pliance with orders. He took a prominent part in the Battle of Long Island and pursued Washington through New Jersey. At Trenton a detachment of his Hessians was captured in 1776, and at Princeton in 1777 he again suffered defeat. He retrieved his losses at Brandywine on September 11, 1777, and secured command of the Delaware River. Disgusted at the lack of cooperation given by Howe, he tendered his resignation, which was not accepted. His surrender at Yorktown made the triumph of



Photo Visual Education Service

SURRENDER OF CORNWALLIS

From a painting in the early national period

the American cause a certainty.

In 1786 Cornwallis was appointed commander in chief and Governor-General of India, where he performed brilliant service. He was afterward Lord-Lieutenant of Ireland, but in 1805 returned to India, where he died.

COROLLA, *ko rahl' ah*. See FLOWER (Flower Structure).

COROLLARY, *kawr' o la ric* See GEOMETRY (Terms Used).

CORONA, *ko ro' na*, a Latin word, meaning a crown. In astronomy, it is applied to a crown, or circle of light, encircling the sun, only visible during total solar eclipses, and even



Photo Visual Education Service

AS SEEN DURING A TOTAL ECLIPSE OF THE SUN

then only for the duration of the eclipse, which cannot exceed 7 min. 30 sec., and is usually much less. See SUN (Corona).

Related Subjects. The reader is referred in these volumes to the following articles

Bright, John
Cobden, Richard
Free Trade
Peel, Sir Robert

CORN OIL. See CORN (Products).

CORN PONE. See BREAD.

CORN THIEF, a name applied to the crow (which see).



Photo: O R O G

A FAMFD CORONATION STONE

Within the enclosure, in a street in Kingston-on-Thames, England, is a water-worn block of granite that was used in druidical buildings (see DRUIDS). Seven old Saxon kings were crowned upon it—more than seven, it is believed, but that number is known. Their names, with dates of coronation, are shown on the base of the stone, as follows: Eadward, 901; Athelstan, 924; Eadmund, 943; Eadred, 946; Eadwig, 955; Eadward, 975, and Aedclred II, 978.

The name is also given to an appendage of certain flowers between the corolla and stamens. This is well illustrated by the cup of the narcissus. Another use of the term is found in architecture, the corona being the upper projecting part of a cornice.

F.B.L.

CORONADO, *ko ro nah' doh*, FRANCISCO VASQUEZ (about 1500-1549), a Spanish explorer, born in Salamanca, a province of Spain. He sailed to Mexico in 1535 and married Doña Beatriz, the daughter of Estrada, royal treasurer of New Spain, thus becoming a leading *grandee*, or high official, at the vice-regal court in Mexico. The Spaniards at this time were hearing stories of seven wonderful and immensely rich cities, called the Seven Cities of Cibola, which Marcos de Niza, one of the Spanish monks, claimed to have discovered on an earlier expedition. On February 23, 1540, Coronado started out with an army of Spaniards and Mexican Indians in search of the reported wealth. On their journey they discovered the canyon of the Colorado and then marched northward, reaching a point near the boundary of Kansas and Nebraska. In the spring of 1542 they returned to Mexico, greatly vexed at finding no cities of fabulous richness. See CIBOLA, SEVEN CITIES OF; KANSAS (History); NEBRASKA (History).

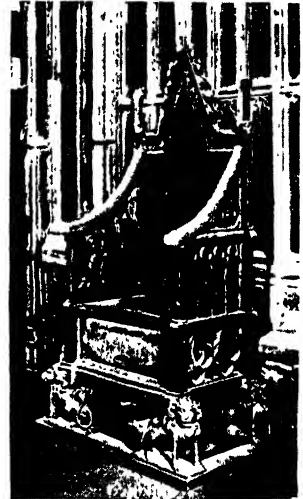
CORONARY, *kah' ro na rie*, ARTERIES. See HEART.

CORONATION, the act or ceremony of crowning a sovereign, as a king or emperor, at which he is publicly invested with the insignia

of royalty. Edward the Elder, crowned in 901, is said to have been the first English monarch to adopt the ceremony, being girt with the sword, lifted into the throne, and presented with the Bible, the spurs, and the orb, or globe, which is part of the regalia of a ruler.

The ceremony is religious as well as political, and is usually performed by a high Church official—in England by the Archbishop of Canterbury. In most countries a solemn pledge, known as the coronation oath, is exacted from the new sovereign as a preliminary to coronation. The ceremony is often deferred, to allow sufficient

time for magnificent preparations, frequently requiring months after the actual accession to the throne. The invitation list includes the monarchs of other countries.



ENGLAND'S CORONATION CHAIR
The "stone of destiny" is seen below the seat.

Coronation Chair, the ancient chair made of oak by order of Edward I, to enclose the famous "stone of destiny" that he brought from Scotland, on which the kings of that country had been crowned for centuries. Round the stone, which legend says is the one that was used as a pillow by Jacob, appear these words, engraved upon it:

If fates go right, where'er this stone is found,
The Scots shall monarchs of that realm be crowned.

The chair is kept in Westminster Abbey, and is covered with cloth-of-gold when moved out before the altar as a seat for a sovereign of England when he is crowned. See WESTMINSTER ABBEY

CORONER, *kah' ro nur*, an officer in each county, whose principal duty is to investigate the cause or manner of death of persons who die suddenly or are slain, or about whose death there appear to be unusual or suspicious circumstances. The law requires that a physician who cannot certify to a death from natural causes shall report the case to the coroner's office for legal investigation. In some states, the statutes give justices of the peace local jurisdiction in the coroner's absence.

A jury of six men is impaneled by the coroner or justice to make inquiry and ascertain, if possible, the cause of death. If indications of foul play are discovered, the report made contains the names of the persons possessing knowledge of the deed, if they are known, and this forms the basis for issuance of warrants for arrest. Coroners receive no salary except in very large cities, their remuneration nearly always being fees for time actually spent in the pursuance of their duties.

In some states, the coroner becomes the temporary chief peace officer of the county in absence of the sheriff.

COROT, *ko ro'*, JEAN BAPTISTE CAMILLE (1796-1875), a French artist, whose fame rests chiefly on his unique landscape paintings, in which the sweet and tender aspects of nature are pictured in browns, pale greens, and silvery grays, producing an effect of delicate loveliness that gives his works the name of "painted music." Corot loved to paint the mists of dawn and the shadows of evening, and his pictures seem usually to be enshrouded in an atmosphere of haze. He found inspiration for much of his painting in the beautiful forest of Fontainebleau; near this forest lay the village of Barbizon, which has given its name to the school of landscape painting of which



Photo. Brown Bros.

COROT

he was called the "lyric poet." (See BARBIZON PAINTERS).

Several examples of Corot's work are in the New York Metropolitan Museum; one of them is the lovely *Ville d'Avray*, in which the soft and mellow color of dawn is relieved by a faint touch of rose in the sky, and by gleams of yellow and blue in the costumes of the women.

His Paintings. Among his best-known canvases is *Dance of the Nymphs*; also important are *In the Woods*, *Rouen, Evening*, and *Souvenir d'Italie*. The latter, one of the most valuable of his paintings, was sold for about \$44,000. He also painted religious pictures, among which are *Baptism of Christ* and *Flight into Egypt*. See page 1697.

COROZO, *ko ro'so*, NUT PALM. See BUTTON (Vegetable Ivory Buttons).

CORPORAL, *kawr' po ral*, the lowest non-commissioned officer in all armies, to which rank deserving private soldiers are appointed. In all armies a corporal's duties are the same. He takes charge of guards and fatigue parties, and has his definitely appointed place in drills. The World War greatly added to the responsibility of corporals and other non-commissioned officers, due to the surprisingly large losses of officers of commissioned rank. Promotions were necessarily rapid.

CORPORAL PUNISHMENT. In the school days of our fathers, or of our grandparents, possibly a more exact period, the ferule and the beech rod were considered to be an essential part of every teacher's equipment; for whipping was common in schools below college rank. It was generally believed that whipping and other means of inflicting bodily pain were necessary to secure the obedience of children, both in the home and the school. This idea has been handed down from one century to another since the days of Solomon, who said:

He that spareth the rod, hateth his son: but he that loveth him chasteneth him betimes.

It is only since the middle of the nineteenth century that the evils of corporal punishment have received careful consideration. Since parents and educators have learned more about child nature, they have discovered that corporal punishment almost invariably has an injurious effect upon the child. It arouses his antagonism, and at best secures only an outward semblance of obedience. In most states and provinces, corporal punishment in the public schools is now greatly restricted or entirely prohibited by law, and most of the large cities have abolished it, even where permitted by law. We have learned that suppression is not discipline, that the truest discipline consists in willing and free action along right lines.

CORPORATION, *kawr po ra' shun*, a corporate body created by law, distinct from the members who compose it, having a special



Dance of the Nymphs. One of the most famous of the paintings of Corot, a canvas of "almost incomparable beauty."

1697

name and capacity for acting as a single individual. It has been defined as a fictitious person. The corporation is immortal, in the legal sense that it can be made capable of indefinite duration; it may sue and be sued in its corporate name; it may acquire property to be used in its business, and—under certain limitations—borrow money; and finally, it has the power to elect officers and to adopt by-laws for the detailed regulation of its business.

Usually, at least three or five persons may form a corporation by applying to the state authority for a charter. In the United States and Canada, the amount of property that may be held by a corporation is frequently limited in the act or charter which authorizes its existence. At one time or another, about one-half the states of the American Union levied a general corporation tax, which is a fixed rate either on the capital stock or on the earnings of all corporations doing business in the state. Nearly all of the states have abandoned this form of taxation, especially since corporations are subject to the Federal income tax.

Public Corporations. Public corporations are those created for the purposes of government, as counties, cities, towns, and villages. For example, a community may become an incorporated village, or a village may incorporate as a city, by meeting conditions laid down by the state legislature. These public corporations may be dissolved or changed by action of the state legislature, subject to the restrictions of the state constitution, and they may sue and be sued, as individuals.

Private Corporations. Private corporations consist of four classes. Those in the first class are not organized for profit of the members; there is no capital, and the object is recreation, education, philanthropy, or other non-commercial intent. The second, or joint-stock corporation, is formed for the financial gain of individual members; the third is organized for mutual aid and relief, and the fourth, known as incorporated trusts, has a fund set apart for special purposes, such as colleges, hospitals, and charitable associations.

Joint-Stock Corporations. The joint-stock corporation is organized by the stockholders, who meet and choose a board of directors, varying in number from three to over twenty. These directors, in turn, choose the officers responsible for the daily conduct of affairs, and fix their salaries. Each man who invests in such a business receives certificates of stock, and usually each stockholder has as many votes as he owns shares of stock. Those holding the largest amount of stock are generally chosen directors, because of their larger interests; but frequently it is true that the officers who manage the routine affairs are only small stockholders, but are chosen for their recognized ability. Any person owning fifty-one per cent

of the stock can elect the officers and control the policy of the corporation. The division of corporation capital into shares affords opportunities to both small and large investors, and the transferability of the securities makes it possible for stockholders to join or leave the corporation at any time, simply by transferring their stock. The corporation may owe money, but the members as individuals are under no obligation to pay the debt; the debts are obligations of the company and not of the individuals composing it. In this respect a corporation differs radically from a partnership. If, however, an individual has not paid up his stock in full, he is liable for the amount unpaid; in some states, holders of bank stock may be assessed double their holdings, in case of failure of the bank.

Corporations in Commerce. The advantages derived from corporations undoubtedly have led to greater economy in production when large resources are combined in manufacture. They have enlarged the facilities in traveling; have cheapened the telegraph and telephone service; have reduced the cost of life and fire protection; and in many other ways have benefited all the people. These advantages, on the other hand, have in a measure been offset by forcing many smaller producers out of the business field. In some instances, too, the standards of business were for a time lowered; for frequently the power of immense capital has been used in questionable ways. In recent years, a higher standard has been approached. This improvement is partly due to government regulation of all large corporations.

Related Subjects. The reader is referred in these volumes to the following articles.

Federal Trade Commission	Partnership
Interstate Commerce Act	Stock, Capital
Joint-Stock Company	Trust

CORPORATION BOOKKEEPING. See BOOKKEEPING, subhead.

CORPORATION TAX, a tax on corporations. See TAX; INCOME TAX.

CORPUS CHRISTI, TEX. See TEXAS (back of map).

CORPUSCLES, *kor' pus els.* See BLOOD (Composition of the Blood).

CORPUSCULAR, *kawr pus' ku lar,* **THEORY.** See LIGHT.

CORPUS JURIS CIVILIS, *kawr' pus ju' ris siv' i lis* (Body of Civil Law). See JUSTINIAN I.

CORREGGIO, *kor red' jo,* the name by which ANTONIO ALLEGRI (1494-1534) is popularly known, was an Italian painter of the High Renaissance. Master of the art of foreshortening (which see), used to give figures the appearance of motion, he was also an innovator in the handling of light and shade, and was unrivaled in ability to impart beauty of expression and grace to his figures. Antonio was

born in a small town near Modena; the name by which he was known was that of his birthplace. He painted both religious and mythological subjects, and was the first artist to decorate a cupola with frescoes.

His Paintings. Exemplifying the method noted above is one of his masterpieces, *Ascension of the Virgin*, which adorns the cupola of the cathedral at Parma. Among Correggio's other religious works are *Night* (commonly called *Holy Night*), now in the Royal Museum, Dresden, and ranked as one of the twelve greatest paintings (see **PAINTING**), and *The Marriage of Saint Catharine*, in the Louvre. His mythological subjects are represented by *Jupiter and Antiope*, in the Louvre, and the *Dance*, in the Borghese Gallery, Rome.



Photo Brown Bros

CORREGGIO

CORRELATION, *kah re la' shun*. A farmer who desires to raise wheat succeeds best in a wheat country; one desiring to raise corn finds another section the most desirable location, and one choosing to raise cotton must locate in the warmer states. Each of these locations is adapted to the crop named because the soil and climate of the locality are especially suited to the respective plants. This fact leads to the conclusion that there is a very close relation between agriculture and geography. There is a like relation between geography and history, between history and literature, between geography and geology, and so on. Arranging subjects so that pupils will study them in their true relations to each other is *correlation*. Correlation increases interest in the subject studied and enables pupils to gain a more thorough and practical knowledge of the various branches pursued. It is receiving marked attention among educators. C.E.S.

CORRESPONDENCE SCHOOLS, institutions organized to provide instruction in various branches of learning by means of lessons sent by mail. These schools aim to reach and benefit at least three classes of people. A person of middle age may deplore his lack of early training and seek to remedy the defect; even if his financial condition makes it possible for him to go to school, he hesitates to enter ordinary school classes on an equality with boys and girls. A teacher may wish to study under competent direction while engaged in his profession, and thus prepare for a better position or work toward a college degree. A mechanic, clerk, or machinist may wish to perfect himself in his chosen vocation by evening study. To such, and to others with needs less specific, corre-

spondence schools have made a strong appeal since President William R. Harper, of the University of Chicago, about the year 1895, declared he could teach Sanskrit by mail as successfully as in the classroom. He exerted a profound influence upon this means of education.

Dr. Harper's courses by correspondence were not the first to be offered, but he doubtless gave to the world the earliest practical ideas on the subject. The University Extension movement in England adopted such means of instruction in 1868, and America put the same plan into operation on a small scale in 1873. Since then, over three hundred correspondence schools of every conceivable type have made their bids for public patronage. Some were organized sincerely to promote education; of this class are the correspondence study departments of the universities of Chicago and Wisconsin, of several state universities and a few privately owned institutions; others have been conducted by people without educational equipment, whose main object has been financial gain.

The schools of the latter class have injured the cause of correspondence instruction by breaking down the confidence of the public; it has been impossible for the prospective student always to determine the educational soundness of the school which sought his patronage, and often he has failed to receive adequate return from his investment. To protect the public from poorly equipped and often unscrupulous institutions, the correspondence schools of the better class organized in 1927 to act with the Federal Trade Commission to curb the activities of unreliable schools. E.D.F.

Related Subjects. The reader who is interested in the subject of schools is referred to the article on **EDUCATION**. It has numerous subheads, while at the close of the article there appears a long list of topics which may also be consulted in this connection. See, also, **SCHOOL**, for a record of publicly controlled education.

CORRODENTIA, *kor o den' shi ah*. See **INSECT** (Classification).

CORROSIVE SUBLIMATE, *ko ro' siv sub' lim ale*, also known as **BICHLORIDE OF MERCURY**, is a compound of mercury and chlorine, in the form of white crystals or a heavy white powder. It is soluble in water and is used by surgeons to disinfect wounds and by taxidermists to protect skins from insects. It is injected hypodermically in the treatment of syphilis. Corrosive sublimate is a most violent poison, and careless people, taking it by accident under the belief that they are swallowing calomel or other headache medicine, are sometimes killed by it. The best antidote is the white of an egg, with which it forms an insoluble compound. In case of poisoning from it, a physician should be called at once, and a strong emetic, as well as the white of an egg,

should immediately be administered to the patient. See MERCURY (metal); DISINFECTANT.

Chemical Designations. Corrosive sublimate is a chemical combination of one atom of mercury and two of chlorine; calomel is a combination of one atom of mercury and one of chlorine. Persons using either of these compounds should see that they are carefully labeled.

CORRUPTION OF BLOOD. See ARTAINDER.

CORSICA, *kawr' sih kah* (French name, CORSE), the fourth in size of the islands of the Mediterranean Sea, and a dependency of France. It is situated about 100 miles southeast of the French coast and a less distance west of Italy, and is separated from Sardinia by the Strait of Bonifacio, nine miles wide. It covers an area of 3,367 square miles, a little less than the combined areas of Delaware and Rhode Island, and has a population of 283,000.

The climate is ever mild, and the soil is fertile, producing olives, fruits, grain, and vegetables. There are forests of pine, oak, cork, and chestnut trees, and well-cultivated vineyards, the source of brandy and wine of good quality. Iron, lead, and copper are mined, and there are valuable quarries of alabaster, marble, and granite. Labor is scarce, but at harvest time many men and women are imported from the mainland. The capital, Ajaccio, is the terminus of the island railway system. It is famous as the birthplace of Napoleon. The house in which "the little Corsican" was born is still preserved there and attracts many visitors. The coral and sardine fisheries are the most important industries. In 1924 the population was over 22,500.

Brief History. The island was first colonized by the venturesome Phoenicians, who named it *Cyrrnos*. The Romans captured it and gave it the present name. From the Romans it passed



LOCATION OF CORSICA

Map shows its position with respect to the cities of Marseilles, Genoa, and Rome, and the location of the capital, Ajaccio.

to the Goths, then to the Saracens, who held it until the fifteenth century. The Genoese then became its masters, and ceded it to France in 1768. In 1795 it came by force of arms into British possession. The French succeeded in

recapturing it in 1796, and have since retained undisputed possession. See, also, SARDINIA.

CORSICANA, TEX. See TEXAS (back of map).

CORTES, *kawr' tes*, the legislative body of Spain. See SPAIN (Government).

CORTEZ. See BRAIN.

CORTEZ, OR CORTES, *kor' tez*, or *kor tays'*, HERNANDO (1485-1547), a Spanish adventurer of the period of Charles V, who, lured by the



Photo Brown Bros

CORTEZ

hope of winning golden treasure, achieved lasting fame as the conqueror of Mexico. He began his career of adventure in 1504, when he sailed for the West Indies. Having distinguished himself in crushing a revolt of the natives in Santo Domingo, he was appointed chief assistant of Velasquez in the expedition sent to Cuba for the conquest of that island; he so impressed his superior officer with his energy, daring, and supreme ability as a fighter that the latter made him commander of a fleet which he was fitting out for a voyage to the mainland of America in quest of gold. When Velasquez subsequently changed his mind and planned to give the command to another, Cortez took matters into his own hands, and before his chief could prevent him, set sail from Santiago, on November 17, 1518. When finally assembled, his fleet consisted of eleven vessels, manned by a force of about 700 men.

Early in the spring of 1519, the expedition landed at the port of San Juan de Ulloa, on the coast of the Gulf of Mexico. A little

north of this place he laid the foundations of the town of Vera Cruz, which he called the "Rich City of the True Cross," and there, having renounced his allegiance to Velasquez, Cortez burned all but one of the vessels of his fleet, so that no one would be tempted to desert him. The one vessel which remained carried messengers back to Spain, to tell the king of the things that had been done, and to ask his permission to continue the work of conquest.

Leaving a garrison of soldiers at Vera Cruz, Cortez led a small company overland toward Mexico, the capital city of the Aztecs, which they reached on November 8, 1519, after being joined by two tribes nearer the coast. The Spaniards were graciously received by Montezuma, the great Aztec emperor, but when Cortez and his soldiers assumed the high-handed manner of conquerors, the Mexicans plotted to drive them from the city. As soon as he learned of the conspiracy, Cortez seized Montezuma and held him as a hostage, forcing him to deliver a vast quantity of gold and precious stones.

Later, the people revolted against both their emperor and the Spaniards, and in the course of the uprising, Montezuma was killed, while the invaders were driven out of Mexico City and pursued for six days, suffering great loss throughout the retreat. Finally, on the plain of Otumba, Mexicans and Spaniards came to open battle, and on July 7, 1520, Mexico was won for Spain. Cortez at once began to reinforce his army with men from the neighboring tribes, and on August 13, 1521, he recaptured Mexico City, after a spirited siege of several months.

In recognition of his services to Spain, Charles V made Cortez governor and captain-general of Mexico, but in 1528 the conqueror was summoned to Spain to answer charges made by his enemies. Though the charges failed to crush him, for the king received him like a royal guest and created him Marquis of the Valley of Oaxaca, still, when Cortez returned to Mexico, he was deprived of his civil authority, his property was kept from him, and he was treated with scant consideration. In 1536 he discovered the peninsula of Lower California, and three years later returned to Spain to ask from Charles V a restoration of his rights. In this he was disappointed, and after passing several years in shameful neglect, he died near Seville, Spain. E.D.F.

Related Subjects. The reader is referred to the following articles in these volumes

Aztec
Mexico (History)

Montezuma
Velasquez

CORTLAND, N. Y. See NEW YORK (back of map).

CORUNDUM, *ko run' dum*, next to the diamond, is the hardest natural mineral. The hardness of the diamond is indicated as 10; that of corundum, by 9. This mineral is a compound of aluminum and oxygen; notwithstanding the lightness of aluminum, corundum is four times as heavy as water. There are many varieties. A coarse, dull-colored, granular form mixed with magnetite is the abrasive *emery*. Transparent varieties form several gems. Blue corundum is the *sapphire*; the red variety is the *ruby*; the yellow, the *oriental topaz*; the green, the *oriental emerald*; the purple, the *oriental amethyst*. The United States imports emery and corundum from Greece and Turkey; there is a small domestic production. A.N.W.

Chemical Formula. The formula for corundum is Al_2O_3 ; that is, a molecule contains two atoms of aluminum and three of oxygen

Related Subjects. The reader is referred in these volumes to the following articles

Amethyst	Hardness
Emerald	Ruby
Emery	Sapphire
Gems	Topaz

CORYZA, *ko ri' zuh*, the technical name for the disease usually termed a common cold. It is an inflammation of the nose, due to infection with an unknown microorganism. The initial symptom is a feeling of dryness and irritation in the nose. Presently, the nose begins to discharge a watery secretion. At this time there is some fever and a general aching. The fever persists for one or several days. The watery discharge gives way to a mixture of watery and of purulent material, and finally to mucus and mucus. There is much sneezing during the onset of the infection. The primary location of the infection is some part of the mucous membrane of one nostril. From there the infection may extend to all parts of the membrane lining both nostrils; to the eyes, causing watering and redness; to the ears, causing earache or middle-ear suppuration; to the mastoid, causing mastoid abscess; to the sinuses near the nose; to the throat, causing sore throat and tonsillitis; to the larynx, causing laryngitis, with hoarseness; to the bronchial tubes, causing bronchitis; and to the lungs, causing pneumonia. Just how much the infection may involve the blood stream and remote organs is not known, though it is fairly certain that some cases of acute Bright's disease are due to coryza, the common cold.

Colds are infective in some degree and under certain circumstances. When a cold develops, one should stay in bed, eating no food but drinking water in abundance so long as there is fever. Medicines should not be sprayed in the nose. Internal remedies, except such as are used to relieve symptoms, are of doubtful

benefit. No specific cure or preventive is known.

Coryza may develop at any season of the year, but the spring and autumn are the seasons of undue prevalence. There is a causative relationship between bad weather, exposure to cold and wet, exposure to hot air, association with crowds, dusty air, and errors in diet. A policy of prevention consists in taking daily cold-water and cold-air baths, sleeping in a well-ventilated room, avoiding crowds, avoiding places where the air is dusty and hot, and avoiding undue chilling and wetting.

The common cold is the most prevalent of all maladies. It outranks all other kinds of illness in frequency, in causing absence from school and work, and in money loss. One of the large insurance companies, by keeping a close check on absences, discovered that colds cost the company 6,233 days of work in a single year. It has been estimated that the annual direct loss of money to wage-earners in the United States, because of colds, amounts to \$60,000,000. Fighting this class of ailments is therefore of economic importance. W.A.E.

Related Subjects. Each of the diseases named in this article as being connected in greater or less degree with coryza is described in these volumes

COSGRAVE, WILLIAM THOMAS (1880-), President of the Irish Free State. He was a simple Dublin business man, practically unknown when the sudden deaths of Griffith and Collins in 1922 forced him to the head of the state in its critical formative period.

Cosgrave was born in Dublin and educated at a school of the Christian Brothers. He entered the grocery business when a young man, and amassed a fortune. Like many of the thoughtful Irishmen of the time, the Sinn Féin movement appealed to him. He became one of the leaders in the Irish struggle for independence, and as a result was more than once in prison.

In 1921 Cosgrave was made Minister of Local Government in the new provisional government. When President Griffith suddenly died, Michael Collins became President and Cosgrave was made acting chairman of the provisional government. Ten days later, Collins was shot, and Cosgrave was thrust into the Presidency, which since that time he has continued to hold.

He has proved to be a team leader, without personal ambition, conciliatory, able to shoulder responsibility and to recognize and use ability regardless of politics or religion. In the fall of 1927, he won control of the Free State Dail by a majority of only seven votes, which seemed to indicate a revival of the power of his opponent, De Valera, leader of the group for complete independence from England.

Related Subjects. The reader is referred in these volumes to the following articles:

Dail Eireann Ireland Valera, Eamonn de

COSHOCTON, *ko shok' tun*, O. See OHIO (back of map).

COSIMO MEDICI, *kahs' ih mo med' e che*. See MEDICI.

COSMETICS, *koz mel' iks*, a term applied to all preparations, externally applied, for the purpose of preserving or beautifying the skin and hair. While the desire for protection against sun and insects may have contributed to their origin, the urge for adornment and the current idea of beauty have been the greatest incentives to the use of cosmetics since pre-historic ages. Palettes for preparing eye paint have been found in Egyptian relics 10,000 years old, and it is said that Cleopatra used clay from the Nile River to beautify her skin. Savage tribes to-day ornament their bodies with colored earth and by tattooing, and apply lard and oils to their hair.

The manufacture of the liquids, oils, creams, and powders that constitute cosmetics in the civilized world is an important industry, with production running into many millions of dollars annually. The various massage creams contain casein, glycerin, fat, water, and perfumes. Starch, chalk, talc, and white bismuth are important ingredients of face powders. All of these preparations tend to clog the pores of the skin and interfere with its natural functions.

With the exception of a few very expensive scents made from flowers, all perfumes are now made of chemical compounds (see PERFUME). Other liquid cosmetics are lotions for the skin, hair tonics, and hair dyes. Skin lotions usually depend for a base upon glycerin, sometimes with olive or almond oil added, and a perfume. Quinine is a common base for hair tonics, but beliefs in its efficiency vary widely. It is generally admitted that the rubbing and massage of the scalp which accompany the application of tonics are as beneficial as the liquid itself. Oils to make the hair glossy, known as brilliantines, contain glycerin.

For many years, in spite of legislation in behalf of purity of foods and drugs, very little was done to control the manufacture and sale of cosmetics, with the result that many harmful substances were sold. For example, few hair dyes are harmless, except those from such



Photo Keystone

COSGRAVE

vegetable matter as henna, sage, and the shells of ripe walnuts. Aniline, salt of lead, copper and silver salts are bases of hair dyes which may poison the whole system. "Freckle removers" and preparations for dissolving hair contain caustic poisons and sulphides which may cause serious burns if carelessly used.

The "cosmetic art" includes the use of all cosmetic preparations for preserving and beautifying the complexion and hair; manicuring, hair dressing, and hair and skin treatments are included in the work. A special branch of surgery is known as *cosmetic surgery*, and concerns itself with improving the personal appearance, as distinct from the field of medicine, which combats disease. The removal of disfigurements is usually a delicate, dangerous task, and there are a large number of ill-prepared practitioners in the lucrative profession of cosmetic surgery. It is imperative, therefore, that great care be used in choosing a reliable physician for such work.

Derivation of the Name. *Cosmetic* is derived from a Greek word meaning to adorn, or to decorate.

COSMIC, *kahz' mic*, **RAYS**, the most powerful of all electromagnetic radiations, sometimes called *Millikan rays*, from the discoverer, Professor R. A. Millikan. They lie at the extreme end of the gamut of electromagnetic waves, among which they have the shortest wave-lengths, the highest frequencies, and the greatest penetrating power. Whereas the most powerful radiations of radioactive elements—the gamma rays—cannot penetrate more than eight inches of lead, the cosmic rays were shown by Millikan to be capable of piercing through eighteen feet of that metal. Their frequency per second is approximately 100 billion billion, and their wave-length in centimeters is about five trillionths. Millikan conducted numerous experiments, extending from 1922 to 1928, before he was assured of the nature of these radiations. He detected them by means of sensitive electroscopes, attached to soaring balloons and sunk beneath the waters of mountain lakes. He found that the rays came from outer space and from all directions, for they were perceptible by night and by day, and were detected in widely separated localities.

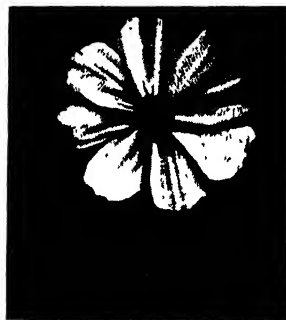
Millikan and an assistant discovered by mathematical calculations that the power of one of these cosmic rays was equal to the strength of the ray that would be released by the transmutation of a hydrogen atom into helium. Further calculations showed that various other rays corresponded to the birth of other elements. In other words, these rays are energy released by the creation of matter in outer space, possibly in the great spiral nebulae that are themselves stellar universes in the making. This discovery is the first positive evidence that the universe is not "running

down," but that building-up processes are taking place, as well as those of disintegration. B.M.W.

Related Subjects. This article is supplemented by the material in the following articles:

Atom	Energy
Chemistry, subtitle	Light
The Elements	Millikan, Robert A.
Electricity	Radioactivity
Electromagnetism	Roentgen Rays

COSMOS, *kahz' mahs*, an interesting, late-blooming garden annual. Brought into the United States from Mexico, its native home, the cosmos has not yet become fully accustomed to the longer hours of daylight, which frequently prevent it from flowering during the summer, but it bravely bears the chilly autumn winds, and blooms with the shorter days of fall, often as late as November. The large late varieties grow six to ten feet high, and are bushlike, with feathery leaves. On graceful, slender stems, the lovely yellow-centered flowers, somewhat like single dahlias, but more delicate, brighten the fence sides and borders with their white, pink, or crimson beauty. The dwarfs grow only about four feet high and bloom as early as July. In a light soil, not too rich, and in a rather sunny spot, cosmos plants will prove very decorative.



COSMOS

B.M.D.

Scientific Names. Cosmos plants belong to the family *Compositae*. Species most commonly grown are *Cosmos bipinnatus* and *C. sulphureus*.

COSSACKS, *kahs' aks*, the name of a class of people who inhabit the southern and eastern portions of Russia, and who were regarded by the Russian czars as a very important military division of the population. The name comes from the Turkish word *kazak*, and means *robber*, a term which no longer defines them. Their origin is not definitely known. When they first attracted notice, they were dwelling on the islands in the Dnieper and on the banks of the Don and the Bug rivers, and consisted largely of men who had fled from their nations or tribes because they wanted greater freedom. The government was tribal, and allowed the greatest freedom to the individual. The tribes were loosely organized into a little republic. In 1549 the Don Cossacks, or Cossacks of the Don, submitted to the czar, but were independent in all local affairs. They did not form a distinct

nationality, but a community, distinct from other Russians because of their manner of life and local government. Under communistic rule since 1917, they have been restive to a degree. Their present number is about 3,000,000.

The Cossacks have long borne a reputation for cruelty, reckless daring, and skill in horsemanship and in the use of arms, and when called upon by the czar to suppress insurrections, they always proved themselves merciless agents of despotism. These bold and hardy troops performed military duty instead of paying taxes, and formed the greater part of the cavalry of the Russian czaristic army. Each cavalryman was required to furnish his own horse. They wore uniforms of dark green and carried short magazine rifles. Some were also armed with long lances. The Cossacks rendered valuable service to the Russian government in the first two years of the World War. C.W.

COSSACK ASPARAGUS. See CAT-TAIL.

COST ACCOUNTING. See ACCOUNTANCY.

COSTA RICA, *kahs' tah re' kah*, the most southerly of the Central American republics, lying between Nicaragua and Panama. The Atlantic and Pacific waters seem almost to meet across this narrow country, which averages but sixty miles in width. It covers an area of 18,400 square miles, according to a



LOCATION OF COSTA RICA

The map shows, also, the proportions of Central America occupied by its southernmost republic.

survey made by the United States in 1928. See CENTRAL AMERICA and NORTH AMERICA (colored map).

The People. The total population in May, 1927, was 471,524. The ruling class consists of the descendants of old Spanish colonists of

patrician type, who for four centuries have remained free from mixture with native strains. The native Indians are of a peaceful and industrious nature, and live in harmony



Photo: U & U

A BANANA FIELD

The native is viewing what is declared to be the largest banana plantation in the world.

with the whites. There are also about 6,000 foreign-born residents, chiefly German and Spanish. On the east coast are 18,000 colored British West Indians; these constitute the labor element in the banana industry.

Costa Rica has conscientiously tried to develop a national spirit of progress and enlightenment, under the guiding hand of the white element. It takes great pride in its educational facilities, which are probably of the best in Central America. The customs and language of the country are Spanish, and the Roman Catholic religion prevails, though other creeds are welcome.

Surface and Climate. The country is traversed from end to end by a range of volcanic mountains; these form a link in the gigantic chain extending from Alaska to Cape Horn. Some peaks rise to considerable heights, and earthquakes occur frequently. The Atlantic coast is low and unhealthy, and abounds in heavy tropical vegetation. On the western coast, the mountains drop abruptly to the Pacific. The central upland region has a healthful, springlike climate, attracting the greater proportion of the population. Frosts are frequent on the mountain peaks, though snow is seldom seen.

Resources. Costa Rica is essentially an agricultural country, and nearly every adult



Photo Visual Education Service

TYPE OF COSTA RICAN LIFE A FAMILY IN FRONT OF THE HOME

male is a landholder. Under a carefully planned system, the government allots land to applicants on advantageous terms; this plan has done much to increase the efficiency of agriculture. The most profitable product is the banana, which is cultivated in the tropical lowlands along the Atlantic coast, the greatest banana land in the world, from which are exported millions of bunches annually. On the uplands, coffee of excellent quality is cultivated extensively for export. Sugar, cacao, rice, and corn are also grown, but only for local consumption. Stock-raising is also an industry of the uplands. There is much land that has never been cleared; it is still covered with virgin forests, and yields an increasing quantity of lumber. Silver, gold, and copper are mined and exported in considerable quantities.

Practically one-half of the imports of the country are received from the United States, to the amount of about \$8,000,000 per year. Great Britain takes nearly half of the exports, or about \$9,000,000, the United States being second as a customer, purchasing about \$8,000,000 of the country's products each year.

Government. Under the republican constitution adopted in 1871 and repeatedly modified, the President of Costa Rica is elected for four years, and is assisted by a legislative body, also elected for four years, numbering one member for every 8,000 inhabitants.

Brief History. Costa Rica was discovered and named by Christopher Columbus in 1502, but was not colonized until thirty years later. Until 1821 it formed part of Guatemala, then became a part of Mexico, together with the four other Central American states. Becom-

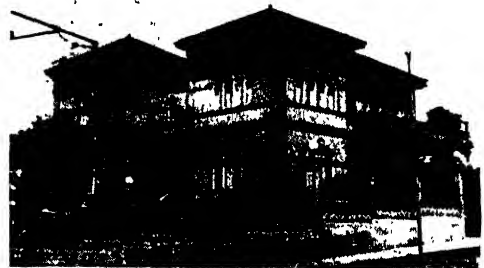


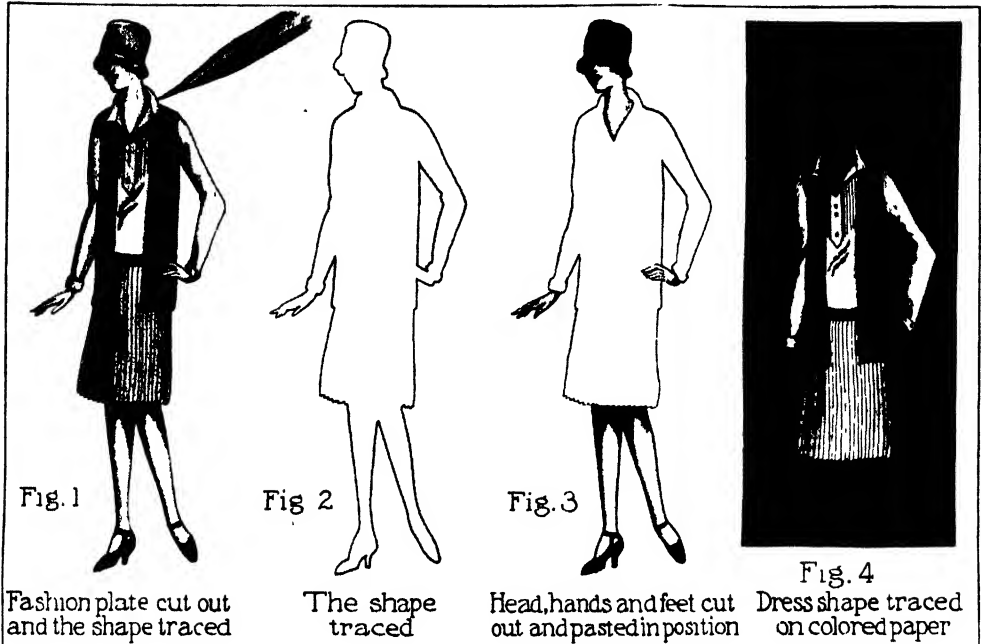
Photo Visual Education Service

THE GOVERNMENT PALACE

Home of the President of the republic.

ing independent later, the states made several unsuccessful efforts to establish a union.

Perhaps the most remarkable feature relating to Costa Rica is that it is a peaceful country, seldom disturbed by such revolutions as are current among its northern neighbors; its chief difficulties have arisen from questions of boundary. In 1921 the United States demanded that Panama concede to Costa



Rica a boundary previously established by arbitration by Chief Justice White of the United States Supreme Court. For its history, see CENTRAL AMERICA.

The Cities. The capital is San José, and there are two ports, Punta Arenas, on the Pacific coast, and Limon, on the Atlantic. Limon is rapidly developing into a modern little city; it has a population of about 12,000, and is the great banana port.

San José, *ho sa'*, the capital and largest city, lies in a fertile agricultural valley of the central plateau region, about 3,500 feet above sea level, where it enjoys a fine climate. It is about midway between the eastern and western coasts, and on the transcontinental railroad connecting the port of Punta Arenas, on the Pacific, with the port of Limon, on the Atlantic. The city has many modern features, including macadamized streets and electric lights, a national library, a national museum, and one of the finest opera houses in Central America. In 1924 an earthquake partially destroyed the town, but rebuilding began at once. It was founded in 1738, and has been the capital since 1823. Population, 1927, 50,580 E.D.F.

COSTER, D., one of the discoverers of hafnium (which see).

COSTER, LAURENS. See PRINTING.

COSTUME. With all school lessons, we find that those studies which we can really use are most valuable. Science teaches how to govern our countries, and how to profit by the experience of others. Geography teaches about climate and crops and about the things that different people do for a living, in various parts of the world. Arithmetic teaches about

business and money, about weights and measures, and how to keep accounts. All of this knowledge is necessary to boys and girls who expect to succeed in the work they plan to do.

How to Apply Art Knowledge. We should make our art lessons useful, also. It is a great accomplishment to be able to paint pictures, but that is not the most important thing that we may learn from the study of art. A few people seem to be born with a genius for painting pictures and for carving or modeling statuary and for designing wonderful buildings. These few, gifted as they are, will paint our pictures, carve our statues, and design our great buildings. We must try to understand their work, so that we may appreciate and enjoy the most beautiful things in the world, even though we cannot ourselves produce them. But for the great majority of people, art can do more than try to teach picture-painting. Art can help us to dress better, to furnish our houses in better style, to lay out our gardens attractively, and to understand how color and form and arrangement are necessary in working out problems in housekeeping and in business.

Every girl, and every boy, too, likes to look well. It is really a pleasure to feel that one is dressed neatly and appropriately. Looking well, in this sense, has little to do with looking fashionable or appearing to be expensively dressed. "Costly thy habit as thy purse can buy" is a safe motto; but that "habit"—which means dress or costume—can be selected with taste and judgment, whether it costs little or much.

COSTUMES: 2000 B.C. to 1600 A.D.



2000 B.C. CHINESE

1000 BC EGYPTIAN (ROYAL)

500 BC GREEK



600 A.D. FRANK

1100 GERMAN KNIGHT OF THE 1ST CRUSADES

1400 ENGLISH



1440 BURGUNDY COURT

1470 BURGUNDY KNIGHT

1590 GERMAN KNIGHT

(LORD) 1566 SCOTTISH (QUEEN)

COSTUMES: 17TH CENTURY to 1860



1650 GERMAN

1690 FRENCH

1700 FRENCH COURT



1780 FRENCH

1770 FRENCH (HOOP SKIRT)

1788 GERMAN



WILL
HAENEL

1800 GERMAN

1818 ENGLISH

1860 AMERICAN

It is therefore a good thing to study, in school and at home, that kind of art which concerns dress, or costume. It is true that we cannot always buy the clothes that we would like; but we can learn a great deal about clothes, so that when we do buy, or when we have a chance to select, our taste and judgment will be worth something.

The fashion sheets that are supplied without cost by firms that have patterns to sell provide the best material for study of prevailing styles and costumes, and colored papers are as beautiful to work with as dress goods and trimmings. It is most interesting to select a costumed figure from a fashion sheet, and use it as a basis for a design in color. Let us see how a problem of this kind can be solved.

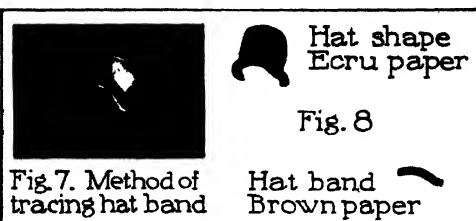
An interesting figure, shown in black and white, was selected from a fashion sheet. The figure was carefully cut out, exactly as one



would cut out a paper doll (Fig. 1). The cut-out figure was then placed on a sheet of heavy white paper, such as drawing paper or water-color paper. A tracing was made on the white paper, with a soft, well-sharpened pencil, resulting in an outline as seen in Fig. 2. The head, hands, and feet were then cut from the original figure, and these parts were pasted in their places on the tracing. The tracing on white paper then appeared as shown in Fig. 3. The traced figure already begins to take on great interest, for the young lady appears to be dressed all in white. We might make a number of modifications of this white costume, if we chose. We could add a girdle, collar, yoke, or various trimmings of lace, embroidery, or ribbons, if we wish to carry out the design in white. As our first intention was to design a costume in color, however, we will proceed to the use of colored papers. Let us select a

pale yellow, or straw color, for the gown, with trimmings of violet.

To obtain the shape of the dress, lay the figure from which head, hands, and feet were cut (Fig. 1), over a sheet of pale-yellow paper. Trace around this shape, as shown in Fig. 4.



Cut out the traced shape, and paste it on the white figure. The lady no longer appears dressed in white; she has donned a gown of pale yellow; but the yellow dress seems plain and unadorned. Here, again, we see in fancy a dozen different styles of trimmings. On this same yellow foundation and with a variety of colored papers, we could work out a number of interesting color schemes. When working with papers, we can make several color combinations and select the scheme we like best. If we were working in silks, chiffons, and fine linen, this would not be practicable. You see that paper costumes have certain advantages over actual costumes.

We select violet for the trimmings of our pale-yellow dress. Lay a sheet of violet paper on your working board. On it place a sheet of carbon paper. Upon the carbon paper place the dress cut from the fashion plate. (See Fig. 5.) With a sharp pencil trace the shapes of girdle, tunic band, cuff, and other trimmings. Cut out these various shapes, as shown in Fig. 6. Paste them neatly in their places on the pale-yellow dress. Note the transformation.

Our dainty lady is now correctly dressed, save for the hat. This still appears in black



and gray. Let us select a light violet paper for the body of the hat. Place thin white paper over the head of the figure. Trace the shape of the hat and rim. This gives the outline shown above the carbon paper, in Fig. 7. Here is also shown the method of tracing the hat shape on light violet paper. Fig. 8 shows the shapes cut from light violet and violet papers. These shapes are pasted in position over the gray and black hat of the wearer. Flower shapes of intense yellow and leaf shapes of yellow-green should be added to the hat, to give the necessary finishing touch to the costume.

The completed costume, which we see in Fig. 9 only in black and white, gives but a faint idea of the color charm of this beautiful design.

As fashions change, our problems in costume design can be kept up-to-date by following the foregoing steps, with figures chosen from the current magazines or fashion plates.

Related Subjects. The reader is referred in these volumes to the articles, *SEWING* and *DRESS*, and to the list of related subjects following the latter.

COTEAU, *ko toh'*, DES PRAIRIES. See *SOUTH DAKOTA (The Land)*.

COTNER UNIVERSITY. See *NEBRASKA (Education)*.

COTOPAXI, *ko toh pak' se*, the loftiest active volcano and one of the most beautiful mountain masses in the world, in shape nearly a perfect cone. It is in Ecuador, in the eastern chain of the Andes Mountains, about forty miles south of Quito and sixty miles northeast of the peak of Chimborazo. A recent estimate gives its altitude as 10,613 feet. Its crater has a diameter of 2,600 feet, with a depth of 1,500 feet. There have been many eruptions, the most recent of which occurred in 1903. Lava seldom flows from this volcano, even during eruptions, but great quantities of ashes are ejected, accompanied by flames and smoke; and noises of explosions are sometimes heard.



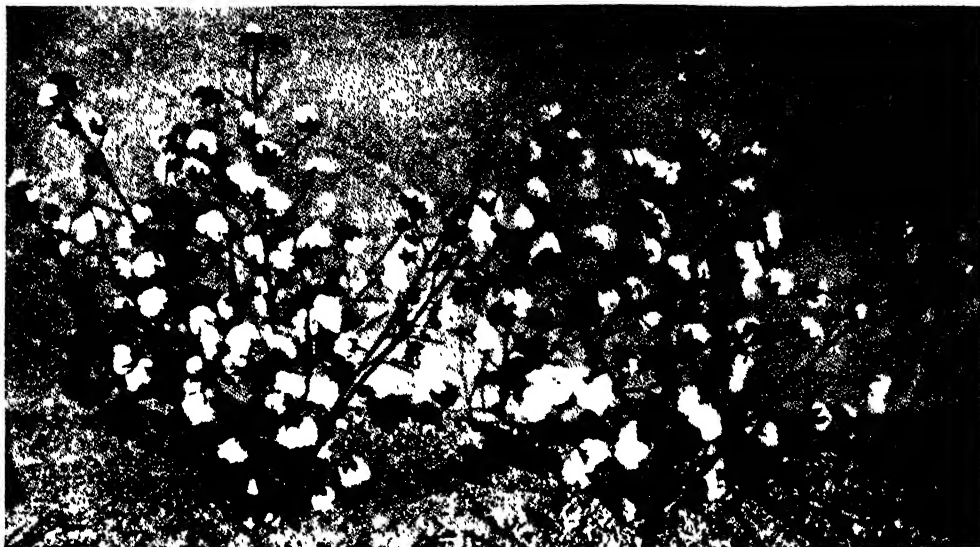
COTTON. Over 400 years before the birth of Christ, the Greek historian Herodotus wrote about a marvelous land in Asia, from which travelers returned with stories of a tree that bore wool "exceeding in goodness and beauty the wool of any sheep." The "fleece-bearing tree" that called forth the praise of these travelers in the Far East was a species of the wonderful plant from whose fibers much of the clothing of the civilized world to-day is made, and whose seeds furnish food for man, beast, and soil; it is a plant deserving well to be called exceedingly good and beautiful, and to bear the title so often conferred upon it—"King Cotton." Since the days of Herodotus many have told of its merits, but none more eloquently than the Southern orator, Henry W. Grady, who said of it:

What a royal plant it is! The world waits in attendance on its growth; the shower that falls whispering on its leaves is heard around the world; the sun that shines on it is tempered by the prayers of all the people; the frost that chills it and the dew that

descends from the stars are noted; and the trespass of a little worm upon its green leaf is more to England than the advance of a hostile army on her Asian outposts. It is gold from the instant it puts forth its tiny shoot. Its fiber is current in every bank, and when, loosing its fleece to the sun, it floats a sunny banner that glorifies the fields of the humblest farmer, that man is marshaled under a flag that will compel allegiance of the world and bring a subsidy from every nation on earth

Brooks, in his *Story of Cotton*, writes:

Cotton to-day is the friend of the poor and the luxury of the rich. It is made into cloth so coarse that it sells for a few cents a yard. It is made into fabrics so fine and so beautiful that it can hardly be told from silk, and so heavy and so thick that experts can barely distinguish it from wool. It is made into rope and cord so strong that it is almost the equal of flax or hemp, and into thread so fine that one pound will reach more than a hundred miles. Every year manufacturers discover new ways of preparing it, and every year the demand for it increases, and the world, it seems, cannot have enough of it. And if, through some calamity, we should lose all goods made



COTTON PLANT IN BEARING STATE

entirely or partly of cotton, and if all people should be thrown out of employment whose occupation is, in any way, dependent upon it—whether in the cultivation, the manufacture, or the commerce—the civilized world would be all but naked, a large per cent of it would be hungry, and the homes would be bare and comfortless.

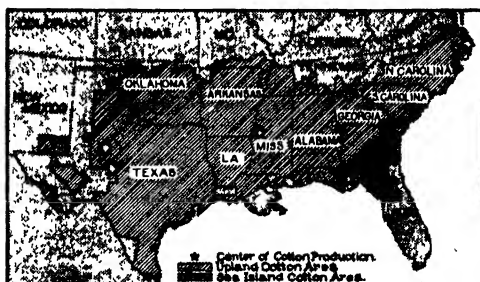
Cotton has been used as a textile from ancient times, but the manufacture of cotton goods was not begun in Europe until the tenth century, when it was introduced into Spain by the Moors. The real development of the industry dates from the invention of the spinning jenny and other devices in the eighteenth century (see SPINNING).

Distribution and Production. The world's annual cotton crop varies from about 20,000,000 to 25,000,000 bales of 478 pounds each, and the United States produces from one-half to two-thirds of this amount. India, Egypt, Asiatic Russia, China, Brazil, Mexico, and Peru follow, in order. In general, the cotton belt extends around the world between the thirty-seventh parallels north and south of the equator. There are two organizations in Great Britain that are giving serious attention to the stimulation of the cotton industry in various sections of the British domain, including dependencies, mandated territories, and self-governing states. The English interests hope, in time, to supply their spindles with their own cotton, and thus be independent of American raw material. Remarkable progress has been made in Uganda and in Kenya, and encouraging yields have followed efforts in Australia, Nigeria, Nyassaland, and South Africa. In the Anglo-Egyptian Sudan, production has been stimulated by the erection

of a dam across the Blue Nile, as this project has increased the territory available for irrigation. Furthermore, the taking over of Iraq by Great Britain is expected to add a profitable cotton area to the sections already developed.

[For cotton areas, on map, see the panel heading of this article.]

In the United States, the geography of the cotton area has been affected by the ravages of the boll weevil (see BOLL WEEVIL). A



COTTON-PRODUCING AREA OF THE UNITED STATES

considerable increase of acreage has occurred in the states west of the Mississippi, for the boll weevil, appearing in Texas in 1892, worked its way toward the Atlantic, and caused a reduction of crops and acreage in the states east of the river, until methods of control were perfected. Naturally, efforts were made to grow crops in regions outside the zones of greatest infestation. Regardless of the depredations of the weevil, Texas always holds first place in acreage and production. Georgia, South Carolina, Oklahoma, Mississippi, Ar-

kansas, North Carolina, and Alabama are the next most important cotton states, their order varying somewhat from year to year.

as one of the most important crops of that state. The culture of cotton is also one of the newer industries of New Mexico.

Kinds. The most important species are grouped into American and Asiatic cottons. The principal Asiatic species are the *Indian* and *Bengal* cottons. The leading American cottons are the *sea-island*, the *Peruvian*, and the *upland*. Numerous varieties and sub-varieties have been developed. The sea-island leads all others in the length and quality of its fibers. These have an average length of 1.61 inches, and they are so fine that one pound can be spun into a thread 160 miles long. This plant has been successfully cultivated along the coast region of South Carolina, Georgia, and Florida, especially in the sea islands off the South Carolina coast, but the advent of the boll weevil so greatly diminished production that the industry has not as yet recovered its prosperity. The South Carolina product is the choicest. Fine fabrics and laces and the finer grades of spool cotton are spun from the long, silky fiber of sea-island cotton, as well as fabrics for balloons, mail bags, and automobile tires.

A variety of sea-island is imported in large quantities from Egypt. Egyptian cotton is less fine than the American product. Its fiber, which has an average length of 1.31 inches, is especially adapted to the manufacture of goods having a smooth finish and silky luster, and it takes the dye admirably. Its tawny color, however, is utilized in the manufacture of goods that require no dye, such as lace curtains of the natural ecru shade. A so-called *Pima* strain of Egyptian cotton is the variety grown in Arizona.

Peruvian cotton, known commercially as "Rough Peruvian," is reddish in color, and its fiber is rough and hairy, like that of wool. It is mixed with wool in making cloth and hats, and is also used in the manufacture of underwear and stockings.

American upland cotton furnishes about two-thirds of the world's supply, and economically it is of supreme importance. Its fibers vary in length, but usually are less than an inch long. The stalk grows to a height of three or four feet. As this is the typical product of the "land of cotton," it is the kind described in the following paragraphs.

In a Cotton Field of the South. At cotton-picking time, the fields present a bright array of green and white, and from a distance the stalks look as if they were crowned with snow-balls. These little balls of white are the precious store of the fruiting pod, or boll, and the fruit of the planter's labor that began months before. In most cases, the wise planter is the one who begins to prepare the seed bed in the fall. Fall plowing insures a bed that will have the proper amounts of air, moisture, and



FLOWER AND BOLLS

At the top are immature bolls; in center, an open boll; below, the cotton flower.

Arizona produces most of the output of American-Egyptian cotton. Cotton is also successfully grown in California, but does not rank

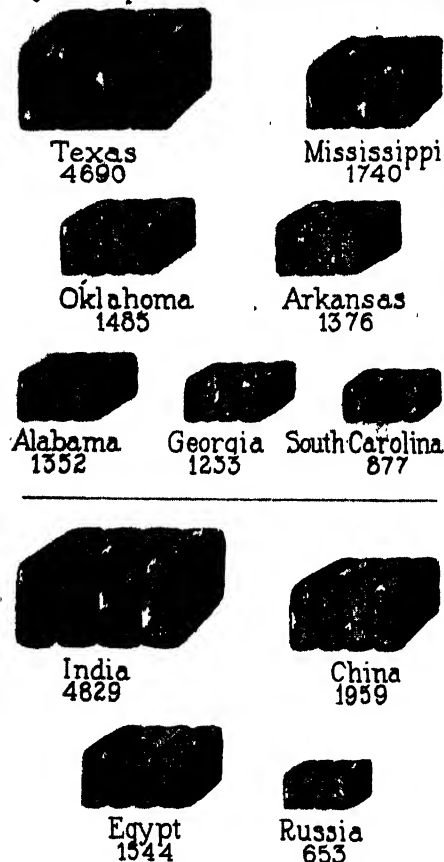


Photo Keystone

On a Mississippi Plantation. A typical scene in a cotton field when the open bolls, fleecy white, are ready for the pickers.

plant food by seeding time. In the northern area of the cotton belt, planting begins in May, but is progressively earlier south of this section. It is customary to drop the seed in long, straight furrows opened on ridges or beds that are from three and one-half to five feet apart. On the large plantations, an improved cotton-planter is used. This opens the furrow and sows and covers the seed, and as it is drawn by a mule or horse, like a plow, it requires

Figures Represent Thousands of Bales



COMPARATIVE CROPS

Production figures change year by year; the above represent the average crops for four years.

the services of only one man, who can plant about eight acres a day.

About ten days or two weeks after the seeds are planted the little stalks with expanding seed leaves push their way out of the soil. These must be carefully cultivated, for cotton will not grow well if it is too crowded, or if weeds are allowed to intrude. After the first cultivation, which is done by machinery on the larger plantations, the plants are thinned out with a

A Booklet on Cotton

Fold three sheets of paper into a booklet of twelve pages.

Cover page—Subject, name of pupil and school.

Illustrate with a border design of conventionalized cotton blossoms.

Inside cover—Index.

Page one—Poem, *The Cotton Plant*.

Illustrations: Illustrate each stanza with the object described—child's dress, child's reading book, newspaper, etc.

Page two—Story of cotton varieties, where raised, planting, cultivating, harvesting

Illustrations. Plant and blossoms, open boll, cotton field.

Page three—Cotton ginning and pressing.

Illustrations. Whitney's gin, showing working parts; modern gin; gin and press building.

Page four—History and growth of the cotton industry.

Illustrations: Hauling to market; cotton market; loading steamer

Page five—Cotton products—fabrics, rope, batting, absorbent cotton, explosives, celluloid, artificial silk.

Illustrations: Old-fashioned spinning wheel; up-to-date spinning frame; loom.

Page six—Cottonseed products—cattle feed, oil, oil cake, meal, hulls, cottonolene.

Illustrations: Oil, cottonolene, meal

Page seven—Cotton textiles—gingham, prints, percales, muslins, calicoes, denims.

Illustrations. Samples of fabrics and development of same. Make an original design for calico

Page eight—Enemies of cotton (see article).

Illustrations: Sketch of boll weevil and plant, showing damage done.

Inside back cover—Biography of Eli Whitney.

Back cover—Blank.

hoe until they stand one foot to two feet apart in the rows, with one stalk to a hill. A special method of thinning, by which the plants are spaced only a hoe width apart, is successfully practiced in some sections. Five successive cultivations are usually necessary, but the cultivation must decrease in depth as the crop grows taller.

When the plants are perhaps a foot high, the squares, or flower buds, open and disclose beautiful yellowish-white blossoms, which turn to a delicate shade of pink on the second morning, because of the effects of the sun's rays. The third day they grow still rosier in color, and



A FORTUNE IN COTTON

Photo. U. S. D.

A familiar scene at Southern ports. Each bale intended for domestic use weighs 500 pounds.

usually fall to the ground before night, leaving behind on the stalk a tiny green boll. Sometimes, when cultivation is neglected or weather conditions are unfavorable, the blossoms carry the bolls with them when they fall, and with them, too, are carried the prospects of a good crop.

At the end of six or eight weeks, the bolls are about the size of a small hen's egg, and then, as if bursting with pride at their store of rich, white lint, they crack open, splitting into three or more parts and announcing that the beginning of picking-time is at hand.

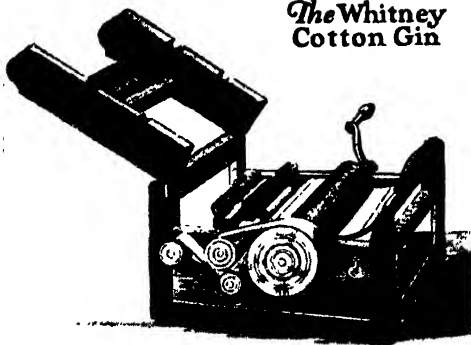
Picking lasts many weeks, because not all the bolls ripen at the same time. The older bolls are the lower ones; a fresh crop is continually produced with the new growth above, and the pickers therefore make several rounds of the fields during the season. Far to the south, the picking begins in July; it starts a little later farther north, and in the Carolinas is not completed until nearly Christmas. The white fleece pulled from the bolls is gathered into bags which hang from the shoulders of the workers; this is emptied into large split-wood baskets, and later loaded on huge wagons and hauled to the "ginnyery," where it is made ready for the manufacturer.

Cotton-picking is still done almost entirely by hand, as in the days before the War of Secession. As yet, no thoroughly successful hand picker has been perfected, though many

experiments have been made to devise such a machine. Improved methods of fertilizing the soil and of cultivating and handling the crop have been worked out by the agricultural experiment stations of the Southern states, from which the planter may always obtain valuable information.

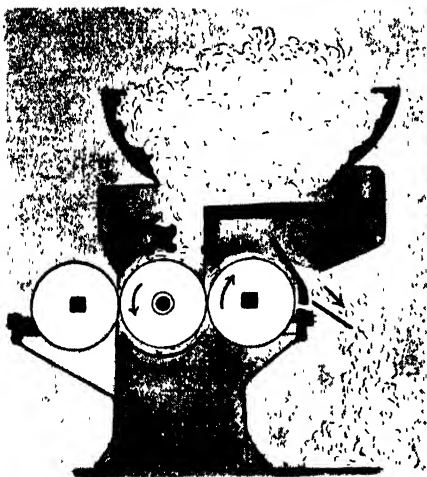
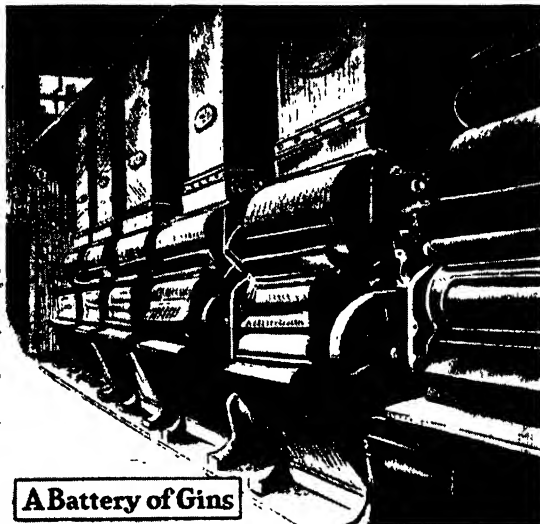
From the Cotton Field to the Market. The transformation of the fleecy white mass gathered from the bolls into the finished cotton fabric involves many operations. The lint which is dropped into the pickers' baskets has, clinging tightly to its fibers, numerous little hard seeds, all of which must be removed. The process of freeing the lint of seeds is known as *ginning*, and the machines are *cotton gins*. The public ginning establishments near the cotton plantations are operated by steam power, and some of them are equipped with four gins of seventy saws each, which clean from 2,000 to 3,000 pounds of cotton a day.

In the Ginning House. The wagons laden with the cotton from the plantations stop under a flexible pipe extending out from the mill. The seed cotton is sucked up into the pipe by machinery and carried through fans, which free it of dust and other impurities. It is then dropped into a gin, and after the seeds are removed, the fleece or lint is carried by machinery into great presses, where it is made into bales. The bales are wrapped in bagging and bound with iron bands, ready to be sent to the

**The Whitney
Cotton Gin**

of the cotton-goods mills spin yarn for their own use, but the processes of bleaching, dyeing, and printing are in many cases carried on in separate factories. Since 1920 there has been a rapid development of coöperative marketing of raw cotton in the Southern states (see CO-OPERATION). This system works to the advantage of both the producer and the spinner. Another progressive step has been the universal adoption of American standards in grading cotton.

Some Cotton Figures. The manufacture of cotton goods in the United States is practically confined to the Southern and the New England states. In textile manufacturing, the spindle is the standard unit of measurement. There are

**Cross Section of a Modern Cotton Gin****A Battery of Gins**

cotton mills. An American bale for the local trade weighs 500 pounds. The bales shipped long distances are compressed again and are much smaller.

In the Cotton Mill. When the cotton arrives at the factory, it is run through various machines which free it of dirt and form it into a *lap* or *roll*. It is then passed through rollers covered with steel-wire points, a process which makes the fibers lie in straight, parallel rows, except as they curl or twist about other fibers. The curls and twists are straightened out in a stretching frame, and the fibers are then twisted and wound on bobbins of decreasing size, until the strands are fine enough to be spun into thread or yarn. When the product is ready for the spinning machine, it is called *roving*. From the spinning machine the thread or yarn is taken to the looms to be made into cloth. The details of these processes are described in these volumes under SPINNING and WEAVING.

The cotton-manufactures industry comprises the three divisions of fabrics, small wares, and cotton-lace goods. In the United States, most

between 37,000,000 and 40,000,000 spindles in the whole country, almost equally divided between the North and the South. Massachusetts has over half of the cotton mills of the North, and North and South Carolina possess most of those operating in the South. Within recent years, the Southern mills have been increasing their output faster than the Northern, especially in the production of the coarser grades of cotton fabrics. In the manufacture of finer grades, the North holds a commanding position.

Great Britain is the most important cotton-manufacturing country of the world, with over thirty-five per cent of the total number of spindles. The United States follows, with about twenty-four per cent. Next come Germany, France, India, Russia, Japan, Italy, Czechoslovakia, and China, in practically that order.

Products and By-Products. Cotton yarns are woven into a wide variety of fabrics. Plain cotton goods with printed designs are known as *calico*, and *gingham* is a fabric woven of

COTTON and COTTON SEED



BUD



OPEN BOLL

SEA ISLAND
EGYPTIAN
LONG-STAPLE UPLAND
SHORT-STAPLE UPLAND
ASIATIC

COMBED LINT



BALE



PLANT



COTTON PICKING



TWINES



CLOTH



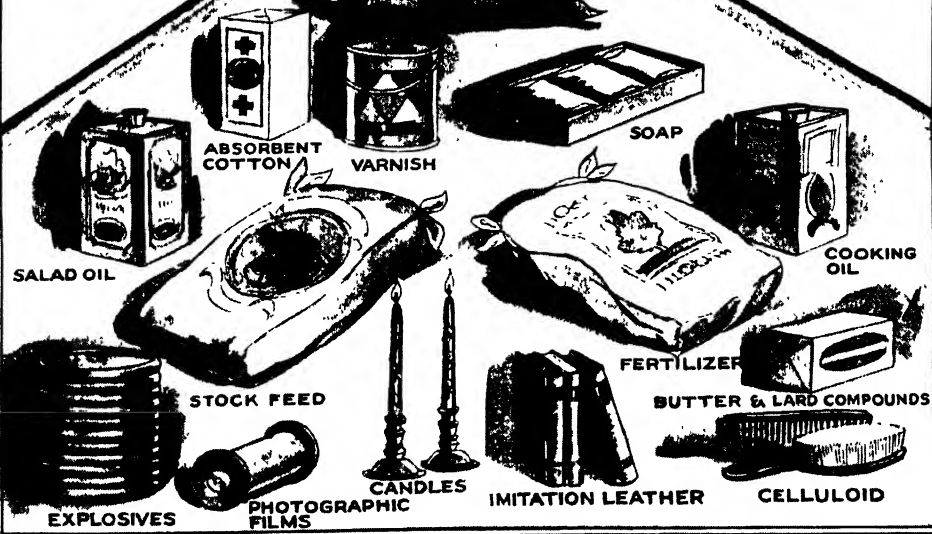
COTTON SEED



CLOTH



THREADS



SALAD OIL

ABSORBENT COTTON

VARNISH

SOAP

COOKING OIL

FERTILIZER

BUTTER & LARD COMPOUNDS

CELLULOID

IMITATION LEATHER

CANDLES

STOCK FEED

EXPLOSIVES

PHOTOGRAPHIC FILMS

PRODUCTS AND BY-PRODUCTS OF COTTON

There was a time when only the fiber of cotton was employed in manufacture and industry; all else was considered waste and was thrown away. Modern research has found uses for practically every part of the plant, and new applications are continually being discovered. The many products and by-products that man finds serviceable to-day are shown in the lists below:

From Cotton Fiber

Awning cloth	Galatea	Percaline
Batiste	Gauze	Piqué
Bedford cord	Gingham	Ratiné
Buckram	Huckaback	Sateen
Calico	Jean	Scrim
Cambric	Khaki	Seersucker
Canton flannel	Lace	Sheeting
Canvas	Lawn	Silesia
Challis	Linon (trade name)	Silkalene
Chambray	Long cloth	Swiss
Cheesecloth	Madras	Tarlatan
Chintz	Mercerized cotton	Terry cloth
Corduroy	Mull	Thread
Crêpe	Mummy cloth	Ticking
Cretonne	Muslin	Toweling
Dimity	Nainsook	Velour
Drill	Organdie	Velveteen
Duck	Osnaburg	Venetian
Flannelette	Percale	Voile

From Cottonseed

Linters	Dyestuffs
Absorbent Cotton	Flour
Artificial Leather	Bread
Cellulose	Crackers
Artificial Silk	Stock Feed
Celluloid Toilet Articles	Oil
Coating for Airplane Wing	Butter Substitutes
Electric-Wire Insulation	Candles
Guncotton	Cosmetics
Photographic Films	Emulsions
Smokeless Powder	Fuel Oil
Writing Paper	Lard Substitutes
Cotton Batting	Lubricants
Felt	Oleomargarine
Fleece-lined Underwear	Paints
Hat Material	Upholstery
Stuffing Material for	Yarns for
Comforts	Carpets
Cushions	Lampwicks
Horse Collars	Rope
Pads	Twine
Hulls	Putty Mixtures
Fertilizer	Salad Oil
Paper Pulp	Sardine Packing
Stock Feed	Soaps
Cake and Meal	Stearin
Confectionery	

OUTLINE AND QUESTIONS ON COTTON

Outline

I. Where Grown

- (1) United States
- (2) India
- (3) Egypt
- (4) Other Countries
- (5) Development of new areas
- (6) Effect of the boll weevil

II. Different Kinds

- (1) Sea-island
- (2) Egyptian
- (3) Peruvian
- (4) Upland
- (5) Asiatic

III. The Cultivation of Cotton

- (1) Planting
 - (a) By means of machinery
 - (b) Season
- (2) Cultivating
 - (a) Season
 - (b) Method
- (3) Picking
 - (a) How the cotton looks
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- (2) Formation of a bale
 - (a) Size
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 - (a) Rolling
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V. Products and By-Products

- (1) From the fiber
 - (a) Fabrics
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 - (a) Linters
 - (b) Hulls
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VI. What the Cotton-Planter Must Fight

- (1) Insect pests
 - (a) Boll weevil
 - (b) Cotton leaf worm
- (2) Disease
 - (a) Wilt
- (3) Methods of opposing these evils

VII. Botany of the Plant

- (1) Family
- (2) Genus
 - (a) Basic species

Questions

Is cotton picked successfully by machinery?

Name some of the destructive enemies of cotton.

Is the cotton from each plant all picked at once?

How many pounds of sea-island cotton would it take to spin a thread long enough to reach from Chicago to New York?

If you went into a cotton field, how could you tell which blossoms had just opened and which had come out the day before?

What are "squares"? What are "linters"? How are the latter used?

What little worm has the power to frighten England more than the advance of a hostile army on her Asian outposts? How is it most effectively fought?

Why can it be said of cotton that it is "the friend of the poor and the luxury of the rich"?

How does the planter know when the cotton is ready to be picked?

Why should the greatest cotton-producing country in the world import any cotton?

What is meant by the statement that this plant "furnishes food for man and beast and soil"?

Make a list of the articles you use in one day, that have cotton in them

cotton threads of different colors. Cotton yarn or cloth treated with a solution of caustic soda is said to be *mercerized* (see **MERCERIZING**). In this process, the fibers shrink a little and take the dye more readily, while the mercerized fabric acquires a glossy appearance like that of silk.

The seeds and stalks are also utilized. In the process of ginning, short, fine pieces of lint, called *linters*, cling to the seeds. These, after the seeds are reginned, are made into twine, rope, and other useful articles. The hulls of the seeds are used in large quantities for stock food, and oil, employed for various purposes, is pressed out of the seeds.

Another by-product is cottonseed meal, obtained by grinding the hard, dry cake left after the oil has been expressed. When sifted, like flour, it is an excellent stock food, and when mixed with acid phosphate, it becomes a valuable fertilizer. Pulp from the stalks finds use in the manufacture of paper, artificial silk, and chemicals.

The articles listed on another page in this article indicate the manifold uses of the cotton plant, and show how indispensable it is to mankind.

Enemies of Cotton. The boll weevil, most menacing of all insects that feed on the cotton plant, is a small gray beetle that attacks the growing bolls and renders their contents useless. The cotton leaf worm, another pest, is the caterpillar of a gray moth. It injures the plants by stripping them of their leaves, thereby depriving them of one of their chief sources of nourishment. The caterpillars may be killed by spraying the plants in July and August with poisons containing arsenic, or by sprinkling them with Paris green. Directions for fighting the boll weevil are given in the article **BOLL WEEVIL**.

Other enemies of cotton are the diseases caused by certain flowerless plants known as fungi (which see). Important among these diseases is *wilt*, produced by a fungus that enters the roots of the plant through the soil, and by clogging the cells or by producing injurious products, causes the leaves to droop and die. No method of curing this disease is known, and it is best fought by destroying infected plants and by means of crop rotation. Extreme dry or wet weather, or poor soil, may cause the drying up or shedding of the bolls by interfering with the supply of nourishment furnished the plant through its roots.

One authority makes the statement that the cotton plant has more to fear from ignorance than from all enemies combined. The more enlightened the planter becomes in matters pertaining to the preparation of the soil and the care of the plants, the better equipped will he be to combat the enemies of the crop and to get a satisfactory return from his fields.

The United States Department of Agriculture has made an exhaustive study of the insect enemies of cotton, and bulletins containing the results of their investigations may be obtained on application. **B.M.D.**

Botany of the Cotton Plant. All species of cotton, whether wild or cultivated, belong to the mallow family, *Malvaceae*; they constitute the genus *Gossypium*. American upland cotton has been derived from *G. hirsutum*; sea-island and Egyptian from *G. barbadense*; Peruvian from *G. peruvianum*.

Related Subjects. The following articles in these volumes will help to make clear the importance of cotton as well as the methods of dealing with it in various stages:

Adulteration of Food-stuffs and Clothing	Crinoline
Boll Weevil	Dimity
Calico	Gauze
Cambric	Gingham
Cellulose	Guncotton
Cloth	Lace
Corduroy	Muslin
Canvas	Shoddy
Cotton Gin	Spinning
Cretonne	Thread
	Weaving

See the articles on the countries and states in which cotton is extensively grown

COTTON, JOHN (1585-1652), a Puritan clergyman, plain and simple, yet of burning eloquence in the pulpit and noted as a profound scholar. He was born at Derby, England, and was educated at Trinity College, Cambridge, where he later became a tutor. About 1612, and for twenty years after, he was the vicar of a church in Boston, Lincolnshire. In 1633 he was summoned to appear before Archbishop Laud because he refused to kneel at a certain point in the Church service. Instead of answering the summons, he fled to Boston, New England, where he preached till his death. He is sometimes called the Patriarch of New England. Cotton wrote and published a catechism, forms of prayer, and other works, chief among them being a defense of the right of civil authority to interfere in religious matters. The latter appeared during his controversy with Roger Williams (which see).



Photo Brown Bros

JOHN COTTON

COTTON-BOLL WEEVIL. See **BOLL WEEVIL**.

COTTON GIN, jin, a machine invented in 1793 by Eli Whitney for separating cotton fiber from its seed. It made cotton the staple crop of the Southern United States and one of the greatest agricultural products in the world, and

caused the extension of slavery, which brought on the War of Secession. Before its invention, the *sea-island cotton* was the only American cotton worth exporting. The rollers which were used to separate it from its seeds would not clear the green-seeded cotton grown inland; a day was required by a workman to pick the seeds from a pound of fiber. Whitney's *gin* (a negro corruption of the word *engine*) consisted of circular saws on a cylinder, turning within a wire cage. The saws pulled the fiber into the cage and the seeds were too large to enter. With very few changes in its original principle, this form of machine is still used. It is not successful, however, with the Egyptian and sea-island cottons, as it breaks their long fiber. For these, the old roller-method, though it produces only about one-fifth as much cotton, is preferred.

The modern roller gin, based on the machine invented centuries ago, was developed early in the present century.

The immediate result of Whitney's invention was that one negro slave, turning the machine by hand, could do the work formerly performed by fifty, and the application of steam power further multiplied the individual output. In the first seven years of the gin, American cotton exports increased over thirty-fold. Cotton planters cultivated all the available land in the South, and their spread into Texas was one of the contributing causes of the Mexican War. A cotton-picking slave became worth five times as much as he was worth in 1792. See COTTON, where an illustration appears; also WHITNEY, ELI.

COTTONMOUTH. See COPPERHEAD.

COTTONSEED MEAL. See COTTON (By-Products of Cotton).

COTTONSEED OIL. See COTTON (By-Products of Cotton).

COTTON STATE, a popular name applied to Alabama (which see).

COTTONTAIL. See HARE, for classification.

COTTONWOOD, a large, comparatively short-lived tree, loved by all who notice Nature at all and especially by dwellers in cities. Early in spring, its glistening buds burst open, and the tree is soon covered with broadly oval, taper-pointed, tooth-edged leaves, which look cool and clean and shining through the heat and dust of summer. The busy householder sometimes objects to the catkins which fall in spring, and to the fluffy, cottony seeds which

blow through doors and windows or stick to the screens in early summer, or to the continually falling leaves; but the shade is very welcome.

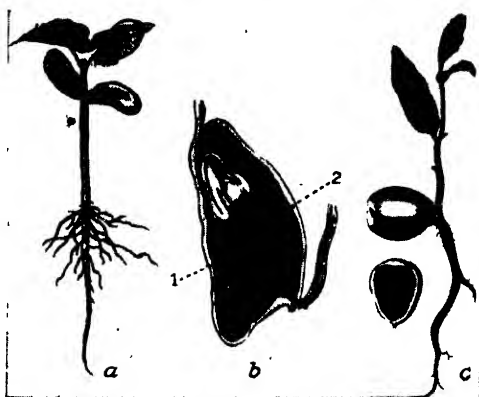
A moist, loamy soil is the best for this rapid growth, and cottonwood trees 100 feet high and more are found, along river banks especially, from Florida to Quebec and west to New Mexico and Colorado. They live from fifty to seventy-five years. The soft, weak, dark-brown wood is used for packing cases, barrels and boxes, woodenware, and for paper pulp. The cottonwood is also known as *Carolina poplar* and *necklace poplar*. Cottonwood refers to the characteristic cottonlike appearance of the opened seed pods. See POPLAR. G.M.S.

Scientific Name. The cottonwood belongs to the willow family, *Salicaceae*, and to the poplar genus, *Populus* (see POPLAR). Its botanical name is *P. deltoides*.

COTYLEDON, *kot i le' dun*, the name commonly given to the first leaves which sprout from a seed. A simple experiment will show



Photo Visual Education Service
COTTONWOOD CATKINS



COTYLEDONS

(a) Bean seedling, showing cotyledons; (b) lengthwise section through embryo end of a grain of wheat; (c) half an acorn cut lengthwise, filled with very thick cotyledons.

these clearly. Soak a bean in water, peel off the skin, and then split the enclosed structure, the embryo. Notice that it is composed of two thick portions which are attached to each other only for a very little way. These are the cotyledons, or seed leaves, and are not to be confused with the tiny *plumule*, or leaf bud, folded away near the joining point. When a new bean plant pushes its way through the soil, these thick seed leaves are clinging to it, but with growth of the seedling they gradually

shriveled and drop off, without even looking like true leaves. All the plants which have their seeds enclosed in cases—*angiosperms*, to use their scientific name—are divided into two groups, according to the number of cotyledons, as follows:

Monocotyledons. These are plants which have only one seed-leaf, for *mono* means *one*. Examples are the palms, lilies, sedges, and grasses, including the grains. A kernel of corn or an onion seed cannot be split easily, as can a bean, for there is no natural line of division into two parts. When some of these plants, as the different grains, sprout, the cotyledon remains below the ground; while in others, as the onion, the cotyledon appears above the ground, but never develops into a true leaf.

Dicotyledons. This word refers to plants which have two seed leaves; they comprise most of the very numerous flowering plants. Some of the seeds are large, like those of the lima bean; some, as the portulaca, are almost as small as grains of dust, but all have the two seed leaves. Like the monocotyledons, these plants sometimes thrust the cotyledons above the ground, sometimes leave them below, but in all cases, such reserve food as they contain is made available to the seedling.

These two great classes comprise all the flowering plants, but the naked-seed plants, or *gymnosperms*, form a different division. The seeds of these have more than two seed leaves, and the group is therefore called *polycotyledonous*, which means *having many cotyledons*. B.M.D.

Related Subjects. The reader is referred in these volumes to the following articles.

Angiosperms	Flowers	Gymnosperms
Botany	Germination	Seeds

COUCH, *kouch*, **GRASS**, a common grass or weed which looks somewhat like wheat. Sheep like it when it first comes above ground, and it makes good hay, but on cultivated land it is a pest. The tough, underground stems, or rootstocks, are far-reaching and continue to spread, often piercing roots of other plants. The seeds, contained in fruiting spikelets, are apt to become mixed with grain seed and lessen its value. Couch grass is also known as *quick grass*, *dog grass*, *wheat grass*, etc., and as *quack grass*, because its rootstocks are often used in patent medicines. Its medicinal qualities, however, are nearly, if not quite, non-existent. The matted roots of a growth of couch grass on a railway embankment are very useful in holding the loose soil together, but the plant is one of the worst of weed pests in Northern United States and Southeastern Canada. Its botanical name is *Agropyron repens*. See illustration, in **GRASS**. B.M.D.

COUGAR, *koo'gur*. See **PANTHER**; **PUMA**.

COUGH, *kawf*. In coughing, we expel air from the lungs, causing the vocal cords to vibrate. The muscles of the chest wall and abdomen contract sharply and suddenly, sending a blast of air through the mouth and

nose. If the air goes through the nose only, it causes a sneeze. If the vocal cords are taut, a coughing sound is made. If the cords are relaxed, there is a soft sound or none at all. The object of a cough is to remove sputum, pus, mucus, or any other foreign material from the larynx, trachea, or bronchial tubes. A cough which results from an irritation of a nerve tract and which is not for the purpose of removing foreign material from the air tubes is called a reflex cough. Reflex cough may be caused by irritations wholly away from the breathing apparatus.

Coughing is a symptom of bronchitis, consumption, pneumonia, and various other diseases. Such coughing as is necessary to keep the bronchial tubes and other air passages free should be encouraged. All other coughing should be suppressed by will power, in so far as that is possible. See **WHOOPING COUGH**. W.A.E.

COULOMB, *koo lom'*, the unit that measures the quantity of electricity flowing past a certain point in one second. By international agreement, one coulomb is the quantity of electricity that deposits 0.001118 of a gram of silver in one second. An electric current carrying one coulomb per second is called a current of one ampere, ampere being the unit of rate or intensity of flow. The ampere is used in expressing strength of current more than the coulomb, because the rate of flow is more important than quantity in practical applications of electricity. The name of the quantity unit was given in honor of the French physicist Charles A. Coulomb (1736-1806). See **AMPERE**; **ELECTRICITY**; **FARAD**. H.S.E.

COUNCIL BLUFFS, IA. See **IOWA** (back of map).

COUNCIL-MAYOR PLAN. See **MUNICIPAL GOVERNMENT**.

COUNCIL OF BLOOD. See **ALVA**, **DUKE OF**.

COUNCIL OF CLERMONT. See **CRUSADES** (First Crusade).

COUNTERFEITING, *koun' ter fit ing*, consists in making, without lawful authority, imitations of money, either paper or coin, or the production of any article in imitation of another with intent to confuse a person in determining the false from the genuine. As the making of money is a function of a national government and not of its states or provinces, the making of counterfeit money is a crime against the sovereign power. Some nations' laws are so stringent that it is a crime even to paint on a billboard an enlarged likeness of any coin or of paper money, or even to print a likeness of a postage stamp; this is true in the United States. Exhibitions are prohibited which show the processes of counterfeiting. Officials are constantly at work in the secret service of all countries to detect makers

and passers of counterfeit money and to punish them. The penalty for counterfeiting or passing counterfeit money ranges from five to twenty years' imprisonment and fines from \$5,000 to \$10,000. As the offense is against the laws of the nation and not against state or provincial statutes, accused persons are tried in courts of the nation's judicial system—in the United States in the Federal District courts.

COUNTER-REFORMATION, the term used to designate the period of Roman Catholic revival, between 1560 and 1648, during which the Church undertook to reform abuses, to counteract the influence of Protestantism in countries where it was apt to be implanted, and to exterminate it where it had taken root. Previous to the Reformation, there had been a demand from the faithful for reform on the part of the clergy, from the most eminent to the humblest, but little was accomplished until the Council of Trent was called, which continued, with interruptions, from 1545 to 1563. This council clearly outlined and emphatically reaffirmed Roman Catholic doctrine, and measures were adopted to correct the prevalent objectionable abuses.

To the Jesuits, zealous, self-sacrificing teachers of Roman Catholicism, is due much of the work accomplished during this period in establishing Roman Catholic missions and in education. Other movements to check the growth of Protestantism were accompanied necessarily by violence. Bohemia was retained after the Thirty Years' War, which was the result of the attempt to repress Protestantism in Germany, and which ended with the Peace of Westphalia in 1648. In Spain and Italy, where Protestantism had only a feeble existence, the movement led to the Inquisition. In England, all outward efforts to effect a return to Roman Catholicism were abandoned after untiring endeavor. G. W. M.

Related Subjects. The reader is referred in these volumes to the following articles

Reformation	Thirty Years' War
Roman Catholic Church	Trent, Council of

COUNTERPOINT. See MUSIC (Growth toward Modernism).

COUNTLESS. See EARL.

COUNTY, a political subdivision of a state or province, having legally defined boundaries designated by the legislature, and possessing certain privileges of independent government within itself. To carry on the principle of local government, the county is subdivided into townships, and the townships into school districts, etc. The county seat is usually the chief center of business and political interest, as here are the county offices, in which official records are kept, and in which sessions of the county or circuit court are held at least twice a year. No division of a county may be made

without the consent of the majority of the voters; neither can two counties be joined without the majority vote of all the citizens affected. Only matters which pertain solely to the residents of the county are proper subjects on which county authorities may legislate absolutely.

County officials are chosen usually for terms of two years each; these are the sheriff, clerk, treasurer, prosecuting attorney or state's attorney, register of deeds or recorder, judge of probate, surveyor, superintendent of schools, circuit court commissioner, and coroner. The sheriff and treasurer are generally eligible only for two successive terms, and the same is sometimes true of the county superintendent of schools; the other officers may continue in office as long as they are able to secure reelection. The amount of salary paid an officer is left to be determined by the board of supervisors or the county commissioners.

COUNTY AGENT, a man who possesses expert knowledge of all phases of agriculture, engaged to work with the farming community, individually and collectively, within the bounds of the county. He studies community needs from every viewpoint, and his advisory services are available to every farmer who invites such cooperation. Specifically, he applies his knowledge to the task of improving the quantity and quality of products of the farm, by group demonstration in crop production and development in livestock; by sponsoring the establishment of boys' and girls' clubs and advising them as they study soils, plant growth, canning, etc.; by bringing to the farmer who has failed in any direction the experience of another farmer who has succeeded in the same line; by intelligent direction of efforts to destroy insect pests which threaten prosperity—in short, to be the intelligent observer, practical demonstrator, and candid friend, within the limits of his duty, to make farming increasingly profitable and to give added attractiveness to farm life in the fields and in the home.

The county agent is a link in the vast enterprise of the Federal government in behalf of agricultural extension. He is a public official responsible to his state college of agriculture, under whose immediate authority he is commissioned; in addition, he is under less direct supervision of the Federal Director of Extension Work in Washington, through linking of Federal and state activities, as provided in the Smith-Lever Act of 1914. His immediate superior is a district or state leader, to whom regular reports are made, and he also prepares annual reports for the state extension service and for the United States Department of Agriculture. B. M. W.

[See illustration, in article CORN; also the article BOYS' AND GIRLS' CLUBS.]

COURCELLE, *koor sel'*, SIEUR DE. See CANADA (History).

COURLAND, *koor' land*. See LATVIA.

COURT-MARTIAL, *kohrt' mar shal*, a naval or military court convened for the purpose of trying distinctly naval and military offenses. The United States army is governed by rules and regulations derived from the British army, and the courts are similar. Commissioned officers may be tried only before *general courts-martial*; commissioned officers compose the jury. *Regimental courts-martial* once dealt with affairs of one regiment, and the jury was chosen from among the members of that regiment. *Garrison courts-martial* similarly dealt with offenses arising within a garrison. A *special court-martial*, convened by authority of a general officer, has within recent years supplanted the two forms referred to above. The decision of such a court is subject to the approval of the authority appointing him; there is no appeal, except to the President of the United States, who is commander in chief of the army and navy. Naval courts are similar in principle, dealing only with offenses committed by naval men.

If the offense for which a man is tried by court-martial is also an offense against the law of the country, the offender may be handed over to the civil authorities to receive penalty. The plural form of the word is *courts-martial*.

COURT OF CLAIMS. See CLAIMS, COURT OF.

COURT-PLASTER, thin silk treated with benzoin and varnished on one side with a glue made of isinglass and glycerin. Black, flesh-colored, and white silk is used in its manufacture, and it is moistened and applied to the skin to protect slight cuts and abrasions from dirt and germs.

Origin of the Name. The word *court-plaster* was derived from the old custom of court ladies, who wore specks of black plaster on the face to set off the delicacy of the complexion. These were cut in various shapes—heart's, stars, half-moons, etc. The practice still persists to some extent.

COURTS, *kohrts*, are tribunals established by a government to control all of its functions which are judicial in character. They exist for the interpretation and enforcement of law and for the preservation of the rights of society and of individuals. Not only do they fix penalties for violations of the law, but the highest courts interpret the laws passed by legislative bodies and determine whether or not they conform to the basic law and should be allowed to remain upon the statute books. The decision of the highest court in determining the constitutionality of a law is final; from such a decision there can be no appeal. Under the provisions of laws which are accepted as constitutional, the courts inflict punishment for offenses against society and also

decide cases in which the rights or interests of individuals are in conflict. The orders of the courts are carried out by bailiffs, marshals, sheriffs, and other executive officers.

[The following paragraphs apply particularly to the United States. For information respecting the courts of Canada and Great Britain, see COURTS, CANADIAN AND BRITISH.]

Original and Appellate Jurisdiction. The term *original jurisdiction* refers to the legal power of a court to conduct the first trial of a case at law. In this it differs from a purely *appellate court*, which may hear only cases which have been tried first in a lower tribunal and appealed to it for a change in the verdict rendered. Some courts have both original and appellate jurisdiction; they may hear cases appealed from a lower court and may also decide new issues.

United States Judicial System. In the United States, there are two distinct systems of courts, one established by Federal authority, the other by the state.

Federal Supreme Court. The Constitution (Article I, Sec. 1) provides that "the judicial power of the United States shall be vested in one Supreme Court, and in such inferior courts as the Congress may from time to time ordain and establish." The first Congress in 1789 decreed that the Supreme Court should be composed of a Chief Justice and five Associate Justices. At the same time the United States was divided geographically into six judicial circuits, for the better handling of court business, and a Justice of the Supreme Court was assigned to each circuit. In 1869 the number of Justices and circuits was increased to nine. Justices of the Supreme Court, like all Federal judges except in the territories, are appointed for life or during good behavior.

Lower Federal Courts. By the same act of 1789, already referred to, the United States was divided into thirteen judicial districts, since increased to 122. In each district there is a district judge, appointed by the President. At first there were no special circuit judges, court being held by the Supreme Court Justice assigned to a circuit, but later special circuit judges were appointed to relieve the members of the Supreme Court of some of their increasing burdens. In part, the circuit judges and district judges had concurrent jurisdiction—that is, either court might try certain cases. This duplication was eliminated in 1911, when the character of the circuit courts was changed. Their original jurisdiction is now vested in the district courts, and the circuit courts are now only courts of appeal. The functions and organization of these courts, as well as of certain special courts, are indicated in the table on page 1723.

State Judicial Systems. The judicial machinery of a state is based on the Federal system, with only slight differences in practice, but confined in its operations strictly to the territorial limits of the state. The highest judicial tribunal is usually the supreme court, though a few states have a higher appellate court below the supreme court or an appellate branch of the supreme court. Each county has

UNITED STATES COURTS

<i>Title</i>	<i>Organization</i>	<i>Jurisdiction *</i>
Supreme Court.	A chief justice, \$20,500; eight associates, \$20,000	This court has original jurisdiction in all cases relating to ambassadors and other public ministers and consuls, and in those to which a state is a party. It has appellate jurisdiction in all cases originating in the inferior courts, save such as Congress by law shall except. Appeals may be made to it, and writs of error lie to it, from the district courts, from the courts of appeals, and from the supreme courts of the District of Columbia and the territories.
Circuit Courts of Appeals.	Nine circuits, to each of which are assigned one Justice of the Supreme Court and from two to five circuit judges, thirty-two circuit judges in all, salary of circuit-court judges, \$12,500.	Appeals from district and territorial courts.
Court of Customs Appeal	Chief Justice, \$12,500, four associates, \$12,500	Reviews decisions of the board of appraisers upon cases involving the collection of customs duties. Decisions may be appealed to the United States Supreme Court. Usually sits in Washington, but may convene in any of the judicial circuits
District Courts	One hundred and three districts, including Alaska, Hawaii, and Porto Rico, each with a district judge, salary, \$10,000	Criminal prosecutions for violation of Federal laws, and cases connected with revenue and postal laws, bankruptcy, and admiralty matters. In a general way, district courts have jurisdiction in all cases assigned by the Constitution (Article III) to the Federal judiciary, except those cases in which original jurisdiction is imposed on the Supreme Court.
Court of Claims	A chief justice, \$12,500, and four associates, \$12,500	Over money claims of individuals against the government.
Court of Private Land Claims	A chief justice, \$8,000, and four associates, \$8,000	Decides conflicting claims of title to certain public lands.
Court of Appeals District of Columbia	A chief justice, \$12,500, and two associates, \$12,000	Hears appeals from the supreme court of the District of Columbia
Supreme Court District of Columbia	A chief justice, \$10,000, and four associates, \$10,000	Resembles in jurisdiction other United States district courts
Territorial Courts	Judges appointed for four years	Resembles United States district courts.
Admiralty	Courts, Commissioners' Courts, and Courts-martial	

* The Supreme Court has both original and appellate jurisdiction; the circuit courts of appeals and the court of appeals for the District of Columbia have only appellate jurisdiction; the other courts only original jurisdiction

its county court, or circuit court, a state judicial circuit may comprise a single county or a number of counties; one circuit judge presides over an entire circuit. The county or circuit court has appellate jurisdiction over cases arising in the justice courts, and original jurisdiction in all civil and criminal cases arising under state laws.

Below the county courts are the judicial tribunals of the township, the justice courts presided over by a justice of the peace, and the municipal courts in cities. Jurisdiction of these lowest courts is usually limited to civil cases where only small amounts are involved,

but in some states it includes examinations of persons accused of crime, to determine whether the accused shall be held for trial to the county court. In such cases, this justice court procedure takes the place of what in other states falls to the duty of the grand jury. In a few states, the justice of the peace may bind accused persons over to the grand jury. For details of the judicial system, see subtitle *Government*, under each state.

Court Procedure, a legal term which refers to the various steps taken in conducting a suit in a civil or criminal court. The action in a civil suit begins with an issuance of a *writ*

of *summons*, which demands that the *defendant* appear in court. In a civil action, the formal statements of the positions taken by the defendant and by his opponent, called the *plaintiff*, constitute the *pleadings*. Then comes the argument of the *issue*. If the facts in the case are admitted, but the counsel for the defense denies that there is sufficient cause for action against the defendant, a *demurrer* is entered. The decision in this case rests with the judge, for the point at issue is one of law. If the facts are questioned, the decision must be rendered by the jury, which acts according to the evidence presented.

The *arrest* of a person accused of crime is the first step in a criminal case. Then follows an *examination* before the proper officer, who either discharges the accused or orders further investigation by the *grand jury*. If the grand jury finds that the evidence warrants it, an *indictment* is entered against the accused, and he is held for trial before a *petit jury*. Between the preliminary examination and the grand jury investigation, and between the indictment and the trial, the accused is confined in jail or is released on bail. In case of such serious crimes as wilful murder and treason, bail is not granted. The evidence presented during the trial is weighed by the jury, and a verdict of guilty or not guilty is rendered at the close. If the prisoner is found guilty, he is sentenced by the judge in conformity with the law. The jury may sometimes make recommendations.

The defeated party in a civil suit may appeal to a higher court for a new trial, and this privilege is also granted the defendant in a criminal case. A defendant declared not guilty of a criminal offense cannot be retried on the same charge.

E.D.F.

Related Subjects. The reader is referred to the following articles in these volumes:

Appeal	Indictment
Arrest	Jury and Trial by Jury
Bail	Parliament (House of Lords)
Constitution of the United States	Supreme Court
Courts	Writ
Demurrer	

COURTS, CANADIAN AND BRITISH. In Canada, as in the United States, there are two classes of courts—Federal and local (provincial). The Federal courts are the Supreme Court of the Dominion, which sits at Ottawa, and the Exchequer Court; the members of both are appointed by the Governor-General in Council. The Dominion government also appoints and pays the salaries of all provincial judges, except the local police magistrates and justices of the peace, who are appointed by the lieutenant governor in council in each province. The provincial government, moreover, determines the organization and procedure of provincial courts. The jurisdiction of the latter—including the provincial supreme

courts, the county courts, etc.—is similar to that of the corresponding courts in the United States.

[For further details, see CANADA (Government); also subhead *Government*, under each province.]

Courts in Great Britain. In Great Britain the functions of a highest court are divided between two bodies, the House of Lords and the judicial committee of the Privy Council. The House of Lords is the supreme appellate court of the kingdom, except for cases arising in the colonies; these are carried, not to the Lords, but to the Privy Council. On the judicial committee of the Privy Council there are judges from these Dominions beyond the seas, appointed for the purpose of representing the opinion of these Dominions [see GREAT BRITAIN (Government: The Judiciary)].

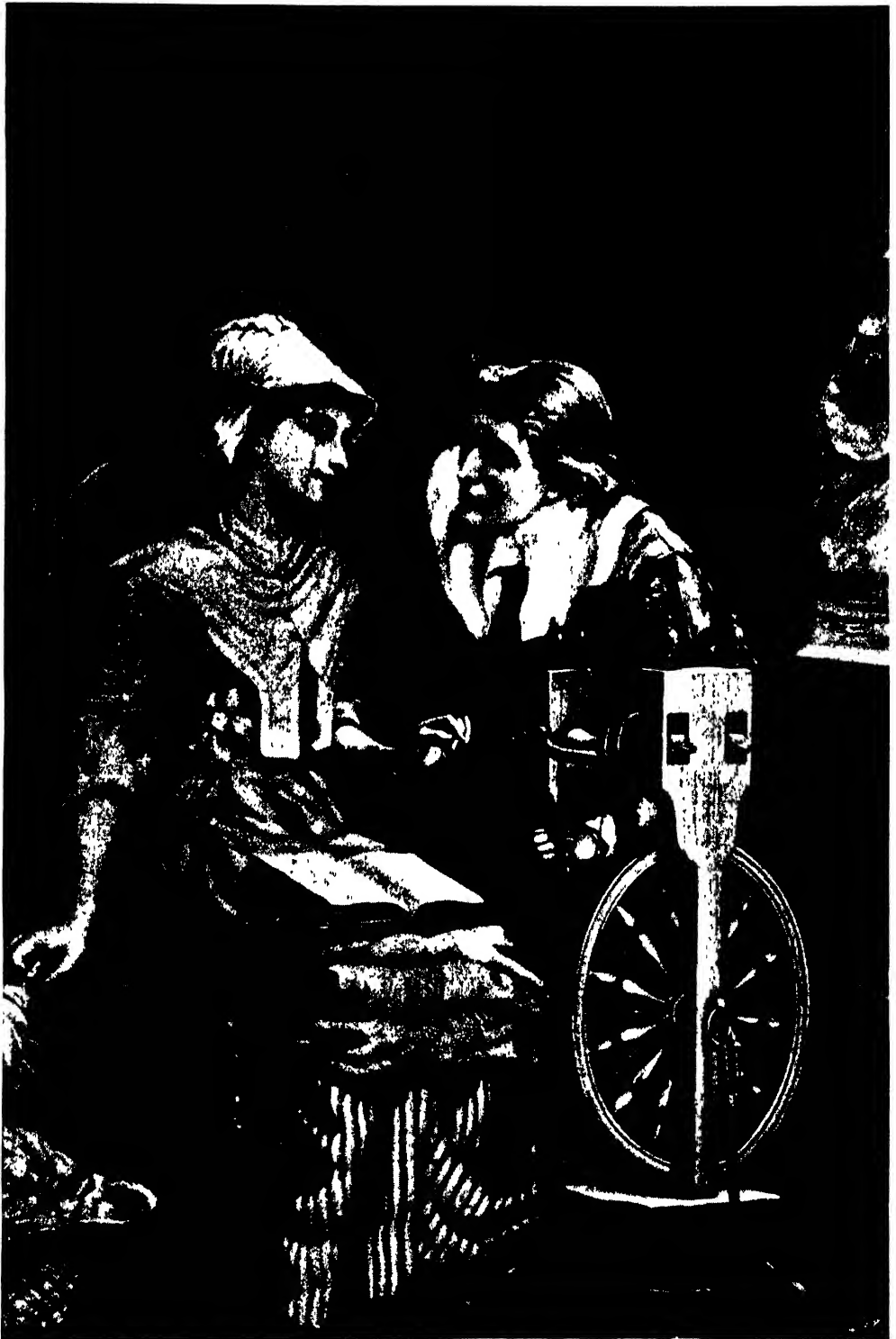
Below the House of Lords is the Court of Appeals, which hears appeals from the three branches of His Majesty's High Court of Justice. These branches are the Chancery Division, the King's Bench Division, and the Probate, Divorce, and Admiralty Division. The King's Bench has jurisdiction over criminal cases and some civil suits, including those affecting the Crown; the jurisdiction of the other divisions is indicated by their names. The Court of Appeals is composed of the Lord Chancellor, any men who have held that office, the Lord Chief Justice, and seven other judges. The inferior or local courts in Great Britain may be grouped in four classes: (1) those having criminal or quasi-criminal jurisdiction, including the (2) borough sessions, petty or special sessions, and general sessions; local civil courts of record, such as the borough and county courts; (3) the university courts of Oxford and Cambridge, with limited jurisdiction when members of the university are involved; and (4) manorial courts, of which a few still survive.

G.H.L.

Related Subjects. The reader is referred to the following articles in these volumes.

Constitution of the United States	Parliament, subhead <i>House of Lords</i>
Justice of the Peace	Supreme Court

COURTSHIP OF MILES STANDISH, one of the best-loved narrative poems of Henry Wadsworth Longfellow, a simple epic of Puritan life in the colony of Plymouth. No poem is more distinctively American in spirit, or pictures more vividly the life of the Pilgrim Fathers in the first New England colony. Three persons stand out prominently in the tale—Captain Miles Standish, a valiant warrior; John Alden, his trusted friend and sharer of his home; and Priscilla Mullins, "the mayflower of Plymouth." During the first hard winter in the new colony, Rose Standish, wife of Miles, died, and in his loneliness the bereaved Captain thought longingly of the beautiful Priscilla. She likewise was grieving



"Courtship of Miles Standish." The narrative informs us that John soon visited Priscilla again on his own behalf.

for loved ones, for among the pathetic group of mounds in the little Plymouth cemetery were the graves of her father, mother, and brother.

The Captain, though fearless in battle, was weak of heart when it came to a matter of wooing. Said he to his friend John—

I can march up to a fortress and summon the place to
surrender,
But march up to a woman with such a proposal, I
dare not
I'm not afraid of bullets, nor shot from the mouth of
a cannon,
But of a thundering 'No!' point-blank from the mouth
of a woman,
That I confess I'm afraid of, nor am I ashamed to
confess it.

So he persuaded young Alden, the handsomest man in the colony, to go to Priscilla and tell her that "a blunt old Captain offered her the hand and heart of a soldier." It happened that Alden himself loved Priscilla, and it was with a sorrowful heart that he opened the door of her home and beheld her—

Seated beside her wheel, and the carded wool like a
snowdrift
Piled at her knee, her white hands feeding the raven-
ous spindle

Eloquently and bravely he pleaded the cause of his friend, but Priscilla, knowing what was in his heart—

smiled, and, with eyes overrunning with
laughter,
Said, in a tremulous voice, "Why don't you speak for
yourself, John?"

The story of the Captain's courtship is based on a well-founded tradition, and a prose version of the tale was published by one of the descendants of John Alden in 1812-1814. This narrative states briefly that John soon visited Priscilla again on his own behalf, and that in due time they were happily married. As for the Captain, it is said that "he never forgave his friend to the day of his death." Longfellow, however, has given the story an added touch of romance, for we read in his poem that the Captain was called away to fight the Indians, but that he returned on the wedding day in time to renew the old ties of friendship and to wish the bride "joy of her wedding." See ALDEN, JOHN; STANDISH, MILES; MAYFLOWER; and references there given. B.M.W.

COVENANT CODE. See PENTATEUCH.

COVENANTERS, *kuv' e nan turz*, a name applied to a group of people in Scotland, the members of which bound themselves by a series of covenants (hence the name) to uphold the Presbyterian forms and doctrines of faith. The most important of the early covenants was drawn up in 1581, at a time when a serious effort was being made to regain Scotland for the Roman Catholic Church. The *National Cove-*

nant of 1638, which was a revival of the covenant of 1581, was adopted and signed at Edinburgh as a result of the efforts of Charles I and Archbishop Laud to force English forms of worship on the Scottish people. The *Solemn League and Covenant*, entered into by the General Assembly of the Church of Scotland and commissioners of the English Parliament in 1643, was practically a treaty between England and Scotland providing for the establishment of the Presbyterian Church in England, Scotland, and Ireland. Both of these covenants were repudiated later by Charles II.

COVENTRY, ENGLAND. See ENGLAND (The Cities); GODIVA, LADY.

COVERDALE, *kuv' er dale*, MILES (1488-1568), bishop of Exeter, England, famed as the man who, in 1535, brought out the first translation of the Bible printed in the English language. He was born in Yorkshire, was educated at Cambridge, and became an Augustinian monk in 1514. In 1526 his religious opinions had so far changed that he left the monastery and devoted himself to the work of the Reformation. The Bible of Cromwell, or the *Great Bible*, was printed under his direction. He was married in 1540, and in 1551 was appointed to the see of Exeter, and there remained until the accession of the Catholic Mary, in 1553, when he was ejected and imprisoned. Through the intercession of his chaplain, who was his brother-in-law, he was released and went to Denmark. After Elizabeth became queen, in 1559, he returned to England and was appointed bishop of Llandaff, but resigned. The Archbishop of Canterbury then made him the rector of Saint Magnus in London, where he remained until his death.

COVEY. See GROUSE.

COVINGTON, Ky., the county seat of Kenton County, is the second largest city in the state. It is on the Ohio River, opposite Cincinnati, and at the mouth of the Licking River. Across the Licking is Newport, Ky. A suspension bridge 2,250 feet long spans the Ohio between Covington and Cincinnati.

Covington is largely a residential town, the home of many Cincinnati merchants. It is the see of a Roman Catholic bishop; the cathedral church, built in flamboyant Gothic, is one of the finest buildings of its kind in the state. The town was settled in 1812, was organized in 1815, and became a city in 1834. Population, 1928, 59,000 (Federal estimate).

Railroads. Covington is served by the Chesapeake & Ohio and the Louisville & Nashville railroads, by interurban and motorbus lines, and by steamers to other Ohio River ports.

Industry. The city claims to have the largest factories in the world for the manufacture of X-ray apparatus, iron fence, and inlaid furniture. Among the other principal products are boilers, cordage, tile, tobacco products, silk, electric switches and stoves



PARTS OF A COW

- | | | | |
|-------------|-----------------|---------------------|-----------------|
| 1. Head | 11. Neck | 21. Dewlap | 31. Heart girth |
| 2. Ear | 12. Throat | 22. Brisket | 32. Udder |
| 3. Horns | 13. Rump | 23. Chest | 33. Milk vein |
| 4. Forehead | 14. Pelvic arch | 24. Hoof | 34. Flank |
| 5. Eye | 15. Hip bone | 25. Ankle | 35. Dew claw |
| 6. Face | 16. Loins | 26. Knee | 36. Shank |
| 7. Nostril | 17. Back | 27. Forearm | 37. Hock |
| 8. Muzzle | 18. Switch | 28. Elbow | 38. Leg |
| 9. Cheek | 19. Tail | 29. Belly | 39. Stifle |
| 10. Withers | 20. Shoulder | 30. Side, or barrel | 40. Upper thigh |

Education. Among the educational institutions are Notre Dame Academy and La Sallette Academy. The city also has a Benedictine priory and a convent.

COW, the adult female of cattle, of the genus *Bos*. The word is also used to distinguish the female of some other animals; the female moose, for example, is called the cow moose, whereas the male is the bull moose. In ordinary use, however, the word *cow*, when alone, means the familiar domesticated animal, which is more valuable to man than any other quadruped, with the possible exception of the horse. In an English periodical, *Household Words*, then edited by Charles Dickens, appeared the following tribute to the cow, said to have been written by the editor:

If civilized people were ever to lapse into the worship of animals, the Cow would certainly be their chief goddess. What a fountain of blessings is the Cow! She is the mother of beef, the source of butter, the original cause of cheese, to say nothing of shoe-horns, hair-combs, and upper leather. A gentle, amiable, ever-yielding creature, who has no joy in her family affairs which she does not share with man.

We rob her of her children that we may rob her of her milk, and we only care for her when the robbing may be perpetrated.

W.N.H.

Related Subjects. For the story of the cow, the reader is referred to the article *CATTLE*. The principal products which man obtains from the living cow are BUTTER, CHEESE, and MILK, and the industry of which these products are the result is called *DAIRYING*. The *CREAMERY* is a comparatively modern feature in the production of butter. From slaughtered cattle the principal products are BEEF, GELATIN, GLUE, LEATHER, and TALLOW. All the topics mentioned are presented in their alphabetical order in these volumes.

COWBIRD, OR **COW BUNTING**, a North American bird which will not rear its own young. The name refers to the habit cowbirds have of gathering in flocks in cattle pastures, to secure the insects that are stirred up by the cows. The male birds, usually more numerous than females, are about eight inches long, with shining black feathers and brown heads. The females are smaller, and are dull brown. Cowbirds feed largely on insects and worms, sometimes on seeds and berries; but since they tend to drive out other useful birds, they are



Photos. Visual Education Service

PICTURING THE HABITS OF THE COWBIRD

This bird has deposited its eggs in the nest of the yellow warbler, and the latter has twice floored the nest over, as related in the accompanying article. In the second illustration, the cowbird has laid its egg (the larger) in the nest of a field sparrow. At right is shown this strange bird, from a photograph.

regarded as a hindrance, rather than a help to farmers.

Cowbirds have the habit of depositing their eggs in the nests of other birds, thereby shifting domestic responsibilities. In this respect, they are like the European cuckoo. The nests of various species of small birds are chosen, and the difference in the eggs is often not noticed by the happy owners. The young cowbird, when hatched, is larger than the true nestlings, and thus it gets most of the food. Sometimes, however, if the intruding egg is recognized, particularly in the nest of a yellow warbler, the nest is sealed over and abandoned, and another nest is built on top of the old one. The habit of nest-stealing is the development of a primitive instinct. Originally, cowbirds probably laid their eggs in the last-year's nests of other birds. The most primitive of the present-day species still retains this habit. The cowbird's call is a grating whistle, followed by a few sharp notes. The common species ranges from Mexico to Southern Canada. See CUCKOO, BUNTING

D.L.

Scientific Name. The cowbird belongs to the blackbird family *Icteridae*. Its scientific name is *Molothrus ater*.

COW BLACKBIRD. See BUNTING.

COWFISH. See GRAMPUS.

COWL, *kowl*, JANE (1890-), an American actress whose real name is JANE COWLES, was born in Boston and educated at Columbia University. In 1908 she was married to A. E. Klauber of New York City, and in 1909 made her first appearance as leading lady in the comedy *Is Marriage a Failure?* She had considerable experience during the next two years in stock companies, after which she placed

herself under able managers. Miss Cowl holds the record for the longest run of a Shakespearean play ever produced in New York, when she appeared as Juliet in *Romeo and Juliet*. One of her most popular comedies was *Smilin' Through*. She was co-author with Jane Murfin of *Lilac Time*, in which she appeared throughout the United States; the two also wrote *Daybreak* and *Information, Please*.

COW PARSNIP, a large, coarse, hog-fat-tening plant of the parsley family. It grows to a height of from three to six feet, and bears handsome, hairy leaves and large clusters of small, white flowers. Though rather striking in appearance, the cow parsnip becomes a troublesome weed if allowed to grow in damp soil near the water. In some places, it is used in place of celery; in others, merely as fodder. In some parts of Siberia, the stalks are fermented and distilled into liquor.

B.M.D.

Classification. The botanical name of the plant is *Heracleum lanatum*

COWPER, *kou' per*, or *koo' per*, WILLIAM (1731-1800), an English poet whose verse pointed the way toward a new epoch in English literature. Love for humanity and Nature, warmth of feeling, and imaginative glow are revealed in his work and show him to have been a pioneer in the movement which reached its height in the poetry of Burns, Wordsworth, and the other Romantic poets (see ROMANTICISM). Having finished his studies at Westminster School, Cowper became a clerk in the office of a London solicitor, and in 1754 was admitted to the bar. He was of a nervous temperament and easily depressed, and about this time he began to suffer from at-

tacks of melancholy that returned at intervals all the rest of his life. A clerkship in the House of Lords was procured for him, but the thoughts



Photo Brown Ikon.

WILLIAM COWPER

of the preliminary examination so unnerved him that he became insane and tried to commit suicide. Upon his recovery, he was taken to Huntingdon, where he formed a memorable friendship with the family of Morley Unwin, a clergyman.

In 1767, shortly after Mr. Unwin's death, Cowper accompanied Mrs. Unwin and her children to Olney, where he remained for nineteen years. In this

village he turned seriously to literary work, making his appearance as a writer in 1779, with the publication of the *Olney Hymns*. Among these hymns is one containing the lines:

Oh! for a closer walk with God,
A calm and heavenly frame;
A light to shine upon the road
That leads me to the Lamb!

Two other favorite songs belong to this group, *There Is a Fountain Filled with Blood* and *God Moves in a Mysterious Way*.

In 1782 he issued a volume of verse containing *Table Talk*, *Truth*, *Expostulation*, and other well-known poems, but it was the publication of *The Task*, three years later, that established his fame. This is a long poem written in blank verse that is suggestive of Wordsworth in its descriptions of natural beauty. With it appeared what is perhaps his best-known poem, *The Diverting History of John Gilpin*. A translation of Homer, begun in 1784, two years before his removal to the neighboring village of Weston Underwood, was published in 1791. Three years later, he suffered from an attack of insanity that marked the end of his creative work.

Though Cowper does not rank with the most distinguished poets of his country, he has an important place in its literature, and many of his lines, such as "I am monarch of all I survey," from *Alexander Selkirk*, and "O, for a lodge in some vast wilderness," from *The Task*, are familiar quotations. B.M.W.

COWPOX. See VACCINATION.

COWRIE, OR COWRY, *kou' rih*, the popular name for the shells of a genus of mollusks, some forms of which have been used as currency and for decorative purposes. The shells

are oval-shaped and are often beautifully marked. The name is also applied to the mollusks themselves. Cowries live in the warmer



Photo Visual Education Service

THREE VARIETIES

In order, from left to right: measled cowrie; money cowrie; serpent's head cowrie.

oceans under rocks and coral reefs, and feed on polyps or sea anemones. The outer lip of the shell is thickened and reflected so that the aperture becomes long and narrow. Among uncivilized tribes, cowries are used for personal adornment, and bands of cowrie shells are used to trim the harness of elephants and horses in India. Dainty little charms, such as beads, bracelets, and brooches, are also made from the small blue-black money cowrie. The small shells employed as money need only to be strung to be used as currency, the value differing in the region where they are the medium of exchange. See MOLLUSKS; MONEY. S.H.S.

COWSLIP, *kou' slip*, the "poet's flower of spring." There are four distinct flowers of different forms and colors which are called by the name. In the United States and Southern Canada, "the marsh marigold shines like fire in fields and copses gray." It is a large, yellow-flowered plant of the buttercup family, and it is frequently called cowslip. It grows in swampy places, and in early spring its leaves and stems are often gathered for greens.



VIRGINIA COWSLIP

When May, with cowslip-braided locks,
Walks through the land in green attire,
And burns in meadow-grass the phlox,
His torch of purple fire.

—BAYARD TAYLOR.

A beautiful plant of the primrose family, with nodding, startled-looking flowers of magenta, pink, or white, known in the Western states as the *shooting star*, is called the *American cowslip*. The petals of the pointed little flower bend backward, away from the shooting, golden anthers. The *Virginia cowslip*, also known as the *bluebell*, or *lungwort*, belongs to the borage family (see LUNGWORT).

In England, the name is given to the *pale primrose*, a pretty little herb found in pastures and meadows. It has a cluster of buff-yellow, scented flowers, in the midst of a rosette of spreading leaves. B.M.D.

Scientific Names. The marsh marigold belongs to the family *Ranunculaceae*. Its botanical name is *Calla palustris*. The American cowslip, a member of the family *Primulaceae*, is *Dodecatheon media*. To the same family belongs the English cowslip, which is classed as *Primula officinalis*. The Virginia cowslip, of the family *Boraginaceae*, is *Mertensia virginica*.

COX, JAMES M. (1870-), three times governor of Ohio and in 1920 the nominee of the Democratic party for President of the United States, on a platform demanding American entrance into the League of Nations. He was born at Jacksonville, O., was reared on a farm, and received a high-school education. Early in life he became a printer, ultimately becoming owner of the *Dayton News* and the *Springfield Press-Republic*. He was a Representative in Congress from the Third Ohio district for two terms ending in 1913, in which year he was first elected governor. He served one term, was retired for one term, and then was again elected for two terms. Governor Cox was twice married. His Republican opponent for the Presidency, Senator Harding, also an Ohioan and an editor, was overwhelmingly elected. See HARDING, WARREN GAMALIELL.

COYOTE, *ki' ote* or *ki ot' e* (Spanish, *co yo'-tay*), the slinking, fleet-footed American prairie wolf so often mentioned in American Indian folklore. Several species live in ground holes or among rocks almost everywhere from the Great Plains to the Pacific Ocean. When they feed on gophers, mice, and other rodents they are helpful, but in the winter, when such ground animals are not to be found, the coyote's snapping yelps heard at night mean death for the ranchman's livestock and poultry. Though they seldom attack human beings,

coyotes are exceedingly troublesome to farmers in the Pacific Northwest, and are boldly coming close to cities. Their control in that region is one of the problems of the United States



Photo Visual Education Service
COYOTE IN RESTING POSE

Department of Agriculture. Coyotes are very cunning and they skilfully avoid traps. They are about the size of setter dogs, and have bushy tails. Their fur is soft, light-yellowish or yellowish-gray, sometimes tipped with black, and is used for coats, lap robes, and driving gloves. See WOLF. M J H.

Scientific Names. Coyotes belong to the family *Canidae*. The plains coyote, or prairie wolf, is *Canis latrans*. In the Southwestern states is found the Arizona, or Mearns, coyote, (*C. mearnsi*).



Photo Visual Education Service
SEA CRABS
Four varieties are shown. The first is an anomalous form (its scientific name is *Phyllolithodes populosus*), the others are true crabs.

CRAB, *krab*, a name given to about a thousand species of small shellfish, many of which are highly valued, but more as a delicacy than as a nutritious food. Most species of

crab are found in seas, especially near the coast, and since they are carrion-eaters, they keep the shore clean; some are also found in fresh water in the warmer parts of the world. A species called the *land crab* burrows in sand or lives in moist vegetation. Some crabs are very tiny, like the *pea crab*, which can make its home with an oyster in its shell. Others are very large, like the *giant crab* of Japan, which measures as much as eighteen feet from tip to tip of the first pair of limbs, or the great *stone crab* of Tasmania, which often reaches a weight of thirty pounds. The color of crabs varies from black to white through all the colors, although green, blue, and gray ones are quite common; the ones with which most people are familiar are dark brown.

Though related to lobsters, crabs have much shorter and broader bodies, and the tail, in reality the abdomen, is very short, and it folds under the thorax. The whole body is covered with a strong shell, jointed between the segments. The shells of head and thorax are fused on top. The young throw off this covering at different times as they grow, when they are full grown, this process occurs every three or four years. Crabs which have just shed their shells are regarded as best for the market, and are known as *soft-shelled crabs*.

The crab's mouth has several pairs of strong mouth parts, including one pair of jaws, and the stomach has a number of hard projections for grinding food. The soft, rich, yellow substance called *fat* is the liver. The eyes are compound, and they are usually placed upon stalks sometimes over an inch long. Some of the deep-sea crabs have no eyes, however, while others have them changed into feelers. The first of the five pairs of walking legs is not used for locomotion, but is furnished with strong claws, or pincers, which are used for defense and for feeling. The right and left claws often differ in shape and in use. Crabs are very active, and have a peculiar habit of running sidewise, instead of straight ahead.

The *blue crab* is most esteemed for food in Eastern America, and each year hundreds of thousands of these are taken, particularly from Chesapeake Bay, by nets and wicker traps. They are, however, very destructive to the oyster beds there, for they crush the shells of the young and eat the flesh. Fishing for edible crabs constitutes an important industry on many coasts. S I S

Scientific Names. Crabs are crustaceans of the order *Decapoda*. The numerous species are grouped into many genera and families. The edible blue crab is *Callinectes hastatus*. The common crab of the Pacific coast is *Cancer magister*. The giant crab of Japan is *Macrocheira kaempferi*. The king crab, so called, is not a true crab.

Related Subjects. The reader is referred in these volumes to the following articles

Arthropoda	Fiddler Crab
Crawfish	Hermit Crab
Crustaceans	King Crab
Delaware	Land Crab

CRAB APPLE, a tree that grows wild from Siberia to Northern China and bears a small, hard, sour apple. In America and other temperate regions, crab-apple trees are cultivated for their fruit, which, though not very palatable when eaten fresh, is excellent for cooking purposes. Crab-apple jelly, jam, butter, and preserves are considered choice products by the housewife who puts up fruit for the winter. The cultivated crab has a superior flavor when used in this way, and is preferred by some to the common apple. Hybrids of

the two are propagated by horticulturists; they bear a larger fruit than the ordinary crab, and the plants are very hardy.

The crab-apple tree is a low, bushy plant about twenty to thirty feet high, with reddish-brown, scaly bark, and angular, thorny twigs



WILD CRAB APPLE

Leaves, flowers, and fruit

covered with oval, sharply toothed, blunt-pointed leaves about three or four inches long. In May or June appear the white, pink, or deep-rose flowers, which have a spicy fragrance. The wood of the tree is soft, but useful for tool handles and other small articles. B. M. D.

[The crab apple is propagated in much the same way as the common apple (see *APPL*). The botanical name of the Siberian crab is *Pyrus baccata*.]

CRACOW. See *POLAND* (The Cities)

CRADDOCK, *krad' ock*, CHARLES EGBERT. See *MURFREE*, MARY NOAILLES.

CRAIGIE, *kra' ge*, PEARL RICHARDS (1867-1906), an English writer of brilliant, cynically witty novels and plays, better known by her pen name JOHN OLIVER HOBBS. She was born in Boston, but was taken to England in her youth and educated there. In 1887 she married Reginald W. Craigie, but secured a divorce eight years later. Her most successful plays are *The Ambassador*, *A Repentance*, and one written for Ellen Terry, *Journeys End in Lovers Meeting*. Among other writings are *The Gods*, *Some Mortals* and *Lord Wickenham, Love and the Soul Hunters*, *The Vineyard*, *Flute of Pan*, and *The Dream and the Business*. The latter was published after her death.



Photo Brown Bros

MRS. PEARL CRAIGIE

CRAIK, *krayk*, DINAH MARIA MULOCK (1826-1887), an English novelist and poet,

best known as MISS MULOCK, the author of *John Halifax, Gentleman*, a picture of middle-class life in England. This sincere and touching story has been translated into many languages. Some of her poems, including *Douglas* and *Philip, My King*, have also been popular, and *The Little Lame Prince* and *The Adventures of a Brownie* hold a prominent place in libraries for children. The *Ogilvies*, *Olive*, *Agatha's Husband*, and *A Life for a Life* are among her less widely read novels.

CRANBERRY, a small, red, acid fruit, without which, in the form of sauce or jelly, Thanksgiving dinner would be incomplete. The cranberry plant is a trailing vine of the heath family, which thrives in marsh or swamp lands in cool temperate climates. The leaves are small, oblong, and evergreen; the flowers are insignificant. In autumn, the bell-shaped or cherry-like fruits appear on small stems, slender and curved like the neck of a crane; hence the name *crane berry*, or *cranberry*.

There are two species of cranberry, one bearing small fruit, the other a larger. The small-fruited cranberry grows wild in both Northern Europe and the United States and Canada; the large-fruited is native to North America, and is the kind most extensively cultivated for American markets. Massachusetts produces nearly two-thirds of the American crop, with New Jersey and Wisconsin following. In this culture, use is made of the low-lying cranberry bog lands. These are leveled, ditched, and often artificially treated with additional sand.

Success in raising cranberries depends upon certain conditions peculiar to this fruit. It requires an acid and not an alkaline soil, and the ground must be so situated that the water can be drained to stand at least one foot below the surface during the growing season; the land must also be of such a nature that it can

be flooded during dry weather, in winter, or when insects are troublesome. When bogs are prepared for cranberry-growing, the native plants that would interfere with the growth of the vines must be rooted up. B.M.D.

Classification. Cranberries belong to the family *Ericaceae*. The large-fruited cranberry is *Vaccinium macrocarpum*; the small-fruited, *V. oxycoccus*. The high-bush cranberry, *V. opulus*, under cultivation becomes a handsome shrub known as *snowball* (which see).

CRANE, a long-legged, long-necked bird, the largest of wading birds. Cranes are related to the rails and resemble the herons. The *whooping crane* of the Mississippi Valley is the largest of American cranes, standing about four or five feet high. It is white, with black wings. Its peculiar cry, which gives it its name, is produced by a curious windpipe, sometimes



CRANBERRY

Branch, flower, and fruit.



Nature Magazine

A GROUP OF SANDHILL CRANES

eight feet long, coiled into the crevices of the breastbone. The range of this bird is interior North America, from Great Slave Lake to Central Mexico, but it has become very rare. The slaty-gray *sandhill crane* is a smaller bird not over four feet high. It breeds from Canada to Arizona, but is rare in the East, except in Georgia and Florida. In winter, it reaches Central Mexico.

The *European crane*, perhaps the best known, is about four feet high, with ashy-gray plumage and blackish face and throat. The head is usually naked, sometimes tufted. The long, stiltlike legs are bare. The bill, longer than the head, is straight and compressed. The tail is short, and the wings are short and powerful. The feet are unwebbed, and the hind toe is raised. The *crowned crane* presents a gay tuft of long, fluffy feathers which extend straight backward from the back of the head.

The cranes live chiefly in marshy lands, spending their summers in north temperate regions, but making long migrations to the south in winter. They feed, chiefly in the early part of the day, on vegetable matter, insects, frogs, worms, reptiles, small fish, and

eggs of water animals. The rest of the time they stand on one leg, dozing, with head drawn back on the shoulders. One of them, however, always stands on guard to warn its mates of

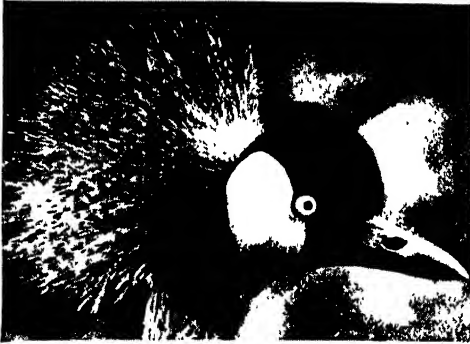


Photo U & U

A STRANGE HEADDRESS

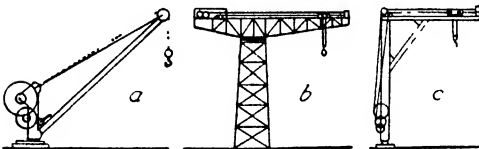
Nature has given the crowned crane's head a decorative effect

approaching danger. The birds nest among bushes or in the marshes, and lay but two eggs.

D.L.

Scientific Names. Cranes belong to the family *Gruidæ*. The whooping crane is *Grus americana*, the sandhill, *G. mexicana*. The European is *Grus grus*.

CRANE, a mechanical device for moving and lifting weights. The name is derived from the supposed resemblance of the arm, or boom, of the machine to the neck of the bird of the same name. The lifting power may be supplied by hand, electricity, steam, compressed air, or water power. The object to be lifted is connected by hooks to a chain, rope, or cable, that is wound round a cylinder or a drum, which is made to revolve. The cable may pass directly from the weight to the drum, or it may be carried over a pulley at the end of a long



THREE VARIETIES OF CRANES

(a) Fixed hand-revolving jib crane; (b) hammer-headed crane; (c) foundry crane (revolving).

arm, as on board ship, where it is used to lift goods from the dock and lower them to the hold, or the reverse. The derrick is a form of rotating crane much used in building operations.

In work where great weights are being constantly lifted and conveyed from place to place, the crane is usually operated by two motors, one supplying the lifting power, the second moving the crane, with its suspended weight, along specially laid rails to the desired

point. The largest crane in the United States Navy Yard at Washington has a lifting capacity of 150 tons; there are, however, many cranes now in use with a far greater capacity. In railway works, a locomotive engine may be conveyed bodily to a distant part of the plant by a powerful crane, and lowered to the ground as gently as if it weighed but a few pounds.

At various ports on the Great Lakes, powerful cranes may be seen in operation as the cargoes of grain, coal, and ore are taken from the holds of huge freight boats. These are equipped with self-loading and self-emptying buckets, some of which hold several tons each. The largest-size cranes will unload 2,000 tons of ore an hour.

CRANE, FRANK (1861-1928), preacher and journalist, was born in Urbana, Ill., and educated in Illinois Wesleyan University and Nebraska Wesleyan University. In 1882 he was ordained a minister in the Methodist Episcopal Church, in which he held important pastorates, the last being Hyde Park church in Chicago. In 1904 he resigned from Methodism, and for five years was pastor of the Union Congregational church of Worcester, Mass. In 1909 he entered the newspaper field as a writer of syndicated material, and for over eighteen years thereafter his work appeared in more than fifty daily papers. His articles contained much of homely philosophy; they stressed the proper outlook on life and emphasized the common virtues. For two years he was editor of the magazine *Current Opinion*.

His Books. Crane was the author of numerous volumes, chief among which were *The Religion of To-morrow*, *Vision*, *The Song of the Infinite*, *Human Confessions*, *God and Democracy*, *Lame and Lovely*, *Footnotes to Life*, *Just Human*, *War and World Government*, *Adventures in Common Sense*, *The Looking Glass*, *Christmas and the Year Round*, *Four Hundred Four Minute Essays* (10 vols.), and *The Crane Classics* (10 vols.).

CRANE, STEPHEN (1870-1900), an American novelist and war correspondent, "whose sun went down while it was yet day." He was born in Newark, N. J., studied at Lafayette



Photo Brown Bros.

STEPHEN CRANE

College and Syracuse University, then engaged in newspaper work. While thus employed, and when but twenty-one years old, he wrote and published at his own expense a realistic novel of street and slum life, *Maggie, a Girl of the Streets*. Five years later, in 1896, *The*

Red Badge of Courage proved his wonderful powers of description. In this story of a raw recruit in battle, his fear on confronting the foe and hearing the whistle of shot and shell is so vividly described, and battle scenes and tactics are so perfectly pictured, that critics could not believe the story had been written by any but a war veteran.

Crane was correspondent for the *New York Journal* in the Greco-Turkish War in 1897, and the next year in Cuba, during the Spanish-American War. All the while he was also writing novels, producing fourteen in eight years, besides many magazine stories. Through overwork, his life was cut short when his brilliant powers were just developing. Among his other books are *The Little Regiment*, *On Active Service*, and *Whilomville Stories*. Some of his manuscripts were gathered by his wife and issued under the titles *Wounds in the Rain* and *Great Battles of the World*.

CRANE, WALTER (1845-1915), an English painter, book-illustrator, designer, art critic, poet, lecturer, and socialist. He was the intimate friend and co-worker of William Morris, Burne-Jones, Rossetti, and the many lesser men belonging to the Pre-Raphaelite school (see **PRE-RAPHAELITES**). Like them, he painted allegorical and mythological subjects, designed wall-papers and tapestries, illustrated his own books and those of other writers, all with equal facility. He was one of the leaders of the Arts and Crafts movement (see **ARTS AND CRAFTS**), and was also associated with Morris in the work of the Kelmscott Press. Crane is perhaps most widely known as an illustrator of books for children, including *The Baby's Opera*, *Pan Pipes*, *Flora's Feast*, *Grimm's Household Stories*, and *Don Quixote*. Paintings from his brush have found a place in many of the great galleries of Europe. Among them must be mentioned the portrait of himself in the Uffizi Gallery, Florence; the *Renascence of Venus*, in the Tate Gallery, London; and the *Fate of Persephone*, in the gallery at Karlsruhe, Germany. His memoirs were issued under the title, *An Artist's Reminiscences*.

CRANE BERRY, a word suggesting the origin of *cranberry* (which see).

CRANE FLY. See **DADDY-LONG-LEGS**.

CRANESBILL, a species of geranium (which see).

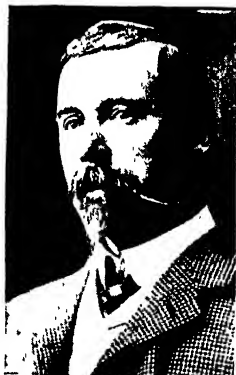


Photo Brown Bros.

WALTER CRANE

CRANIAL NERVES. See **NERVOUS SYSTEM**, subhead.

CRANIUM. See **BRAIN**.

CRANMER, THOMAS (1489-1556), the first Protestant Archbishop of Canterbury, famous for his activity in promoting the English Reformation during the reign of Henry VIII. In 1523 he received the degree of Doctor of Divinity from Jesus College, Cambridge, and was appointed lecturer on theology. He brought himself favorably to the notice of the king by suggesting that the question of the latter's divorce from Catharine of Aragon be submitted to the European universities; later he was a pliant servant of his sovereign in the divorce proceedings, in the elevation of Anne Boleyn as Henry's second wife, and in the downfall of herself and of Henry's fourth wife, Anne of Cleves.

Cranmer was consecrated Archbishop of Canterbury in March, 1533, and actively supported Henry in his efforts to check the power of the Pope. By the will of Henry VIII, he became one of the regents for the youthful Edward VI. When Mary came to the throne, the archbishop was sent to the Tower, together with his fellow Protestant workers. In 1554 they were removed to the common prison at Oxford, on the charge of heresy. Cranmer's sufferings so weakened him that he signed several statements repudiating his former acts, but at the end he regained his courage and showed great fortitude while suffering martyrdom at the stake. When the fire was lighted, he thrust into it the hand which had signed his recantations, and exclaimed, "This hath offended; oh, this unworthy hand!"

B.M.W.

Related Subjects. The important events centered about Cranmer are further described in various articles in these volumes, as follows:

Boleyn, Anne	Latimer, Hugh
Catharine of Aragon	Reformation (English)
Henry (VIII, England)	Ridley, Nicholas

CRANNOGS, *kran' ogs*. See **LAKE DWELLINGS**.

CRANSTON, R. I. See **RHODE ISLAND** (back of map).

CRAPE, or **CRÊPE**, *krape*, the cloth of mourning in many countries, a crinkled, wiry, transparent stuff made of well-twisted raw silk. When woven, it is gummed, and in drying, the threads partly untwist, giving the wrinkled appearance. It was first manufactured and used in Bologna, Italy, and its name comes from the Latin word meaning *curled*. It is usually dyed black, but is also made in other colors. Crêpe de chine is a soft, gauzy silk fabric with a crape surface, resembling Canton crape, though often of inferior quality. Crêpe meteor has a lustrous, satin-weave face, with a crape back. Georgette crêpe, a very thin sheer silk, has a crape finish. Japanese

crape and several other varieties of cotton crape are widely used for kimonos, children's clothing, and underwear.

Crape cloth is a woolen fabric whose crinkled surface is produced by running the cloth through rollers. Crape paper, so much used for decorative purposes, is a crinkled paper resembling the crape cloth.

CRASSUS, *kras' us*, MARCUS LICINIUS (about 115-53 B.C.), a Roman surnamed DIVES, THE RICH, exceedingly fond of wealth and skilful in the ways and means of accumulating it. When Sulla, the merciless leader, landed in Italy, 83 B.C., Crassus joined him, and rendered such important service that he was allowed to purchase confiscated property and estates at a nominal value. In 71 B.C., he was created praetor, and took command against Spartacus and the revolted slaves. In 70 B.C., Crassus was elected consul, having Pompey, whom he hated, as his colleague; he was made censor in 65, and with Caesar and Pompey was a member of the first triumvirate in 55. He was slain through treachery of the Parthians.

Related Subjects. The reader is referred in these volumes to the following articles

Caesar	Pompey	Sulla
Censor	Praetor	Triumvirate
	Spartacus	

CRATER LAKE. See LAKE; OREGON; PARKS, NATIONAL.

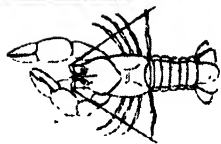
CRATER LAKE NATIONAL PARK. See PARKS, NATIONAL.

CRATER OF THE MOON MONUMENT. See MONUMENTS, NATIONAL.

CRAWFISH, OR **CRAYFISH**, a fresh-water, lobster-like shellfish. The young are carried under the broad tail of the mother in the same



Photo St. Clair



THE CRAWFISH

way as are the lobsters, and the two animals have the same general structure. The crawfish is smaller than the lobster, however, being about six inches long. The color is greenish-brown.

Crawfish are abundant in fresh waters of America, Europe, and Northern Asia, and in some of England's streams. At night they come from burrows in grassy banks or from under stones in the streams, and catch mollusks, small fish, or the young of water insects. In some sections, their burrowing habits destroy crop land or weaken levees and milldams. Like the lobster, the crawfish is a fighter; if an eye, or one of its four pairs of walking legs, or one of the two pincers or claws is lost in battle, a new member soon grows in its place.

In Europe, crawfish are esteemed as food, but in America they are seldom eaten, though some thought has been given to developing an industry to offset the decrease in the lobster supply. See CRUSTACEANS; LOBSTER. S.H.S.

Scientific Names. Crawfish are placed in the family *Astacidae*. The American species belong to the genus *Cambarus*. The common crawfish of Europe is *Astacus fluviatilis*.

CRAWFORD, FRANCIS MARION (1854-1909), an American novelist whose remarkable power of description and graceful, vivid style won him wide popularity. He was the son of Thomas Crawford, the sculptor, and was born in Italy. His education was received in America, England, and Germany, and at Rome he studied Sanskrit. He went to India as a journalist, and during 1870 and 1880 was editor of the *Indian Herald* at Allahabad, India.

His Writings. Crawford's first novel, *Mr Isaacs*, was published in 1882. This story of modern India brought him fame in three continents, for the rich romance and the picturesque settings were new and welcome to the reading public. *Dr. Claudius*, *A Roman Singer*, *Zoroaster*, and *A Tale of a Lonely Parish* followed during the next four years, and then appeared a series of stories of modern Rome, *Saracinesca*, which have been regarded as his most important works. But later ones, including *Marietta*, *A Maid of Venice*; *In the Palace of the King*, *Whosoever Shall Offend*, and *The White Sister*, have been eagerly read. The latter was successfully dramatized for the stage, and also presented effectively as a moving picture, with Miss Lillian Gish as the heroine.

CRAWFORD, ISABELLA VALANCEY. See CANADIAN LITERATURE (English Canada).

CRAWFORD, THOMAS (1814-1857), the American sculptor who made the impressive bronze statue of *Liberty*, which stands nineteen and a half feet high above the dome of the Capitol in Washington, D. C.



Photo Brown Bros.

F. MARION CRAWFORD

[In the article WASHINGTON, a picture of the bronze *Liberty* is printed.]

Crawford was born in New York City, where he began his studies, but when twenty years old he moved to Rome, Italy, to become the pupil of Thorwaldsen. His studio there was a popular meeting-place of lovers of art. Although his life was short and he had lost his sight a few years before his death, he left many pieces of work expressing deep poetic imagination, nobility of thought, and originality of design.

Other Work. The equestrian monument of Washington at Richmond, Va., and various other statues of noted men, such as *Beethoven* and *Clay*, as well as *Orpheus and Cerberus*, *Adam and Eve After the Expulsion*, *Hebe and Ganymede*, *Mercury and Psyche*, and *The Indian*, are especially interesting.

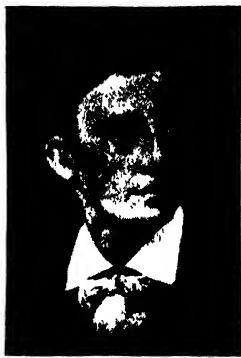


Photo. Brown Bros.

THOMAS CRAWFORD

CRAWFORD NOTCH. See NEW HAMPSHIRE (The Land); APPALACHIAN MOUNTAINS; WHITE MOUNTAINS.

CRAWFORDSVILLE, IND. See INDIANA (back of map).

CRAYFISH. See CRAWFISH.

CRAYONS, *kra' onz*, pencils of charcoal, chalk, or a fine paste of chalk or pipe clay, colored with various pigments. They reach the market in all colors and tints. Such crayons are used for drawing on paper, wood, or on other materials, such as school blackboards.

Pastels, or crayon paintings, are more quickly made than oil- or water-color paintings and are softer and richer in effect, but they soil easily and must be kept under glass. In pastel work, sometimes the colors are first rubbed on the paper with the fingers, then the outline is finished with crayons. Charcoal crayons are used principally for drawing faces and the human figure. Crayons used in lithography are smooth and greasy, and usually made of a mixture of wax, soap, resin, and lampblack.

CREAMERY, an institution of American origin, is a factory where butter is made. The first creamery known began operations in 1861, in Orange County, N. Y. Ten years earlier, the first cheese factory had been erected in this same region, and its success led directly to the adoption of factory methods in making butter. The creamery system spread rapidly to other dairying sections of the United States and also to foreign countries. Minnesota is the leading producer of creamery butter, and is usually followed by Wisconsin and Iowa.

These three states furnish nearly 400,000,000 pounds, or twenty-five per cent, of the creamery output of the United States. Ontario and Quebec divide over ninety per cent of the Dominion's production of creamery butter between them.

Organization. Creameries are organized on three plans. Coöperative creameries are owned by the farmers, or "patrons," who usually choose from their own number a committee to operate the factory. The cost of operation and the proceeds of the sales are divided among the patrons in proportion to the amount of milk, of cream, or of butter fat in their consignments. A second form of organization involves the formation of a stock company, all the stock being owned by the patrons who deliver milk to the factory. Under a third plan, the farmers sell their milk or cream outright to the private owners of the creamery. The owners operate it for their own profit, and in so doing relieve the dairyman of the necessity of finding a market for his manufactured product.

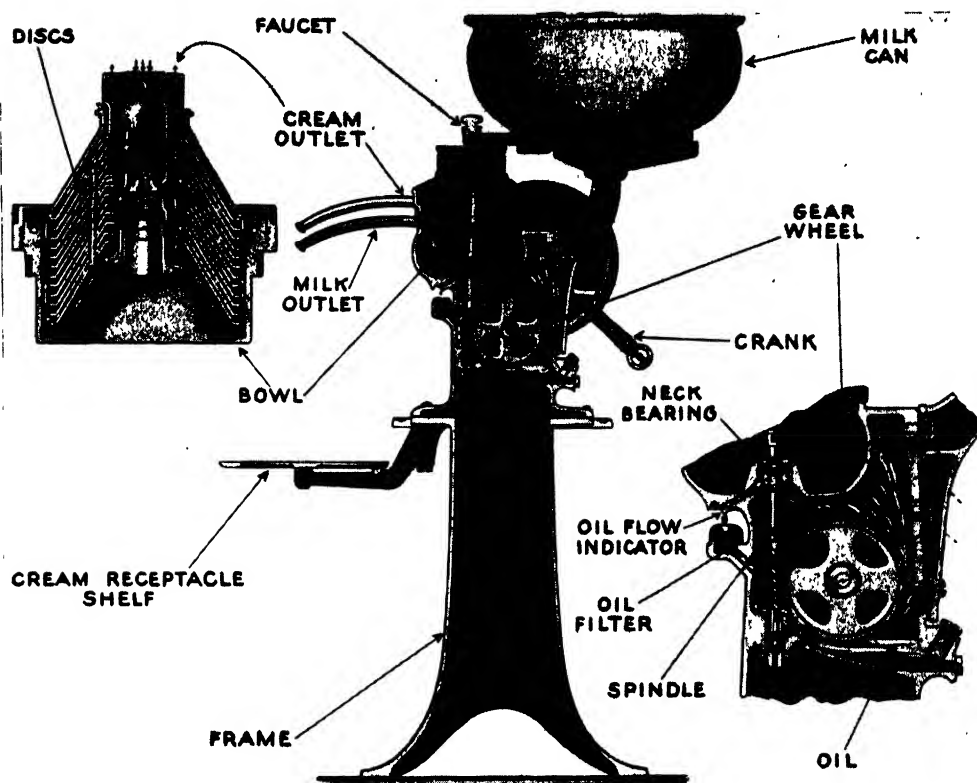
Plan of Operation. Whatever the form of ownership, the farmers may deliver the milk to the creamery, where the cream is separated by machinery, or they may raise or separate the cream at home and send it to the creamery every two or three days. Formerly, a large number of creameries established skimming stations at points convenient to the farmers; there the milk was run through a separator and the skimmed milk returned to the patrons. The farmers were formerly paid by the weight or quantity of the milk or cream, but now usually by the amount of butter fat as determined by the Babcock test.

A well-equipped creamery has the apparatus for testing milk and cream, a vat or series of vats for receiving milk, and other vats for holding the cream and the skim milk. The cream separator is usually operated by a motor driven by a steam or gas engine, or by electricity. Some of the largest creameries have a capacity of twelve to fifteen tons of butter a day. The production of creamery butter, generally considered, is a vast improvement over the ordinary farm methods. The milk and butter are handled by experienced men, who use machinery which reduces the cost of production and also makes it easier to maintain a uniform quality. The payment for cream on the basis of butter fat has also stimulated the farmers to keep better cows, or cows better suited to the purpose for which they are kept. See CREAM SEPARATOR. E.H.F.

Related Subjects. The reader is referred to the following articles in these volumes:

Butter	Cream Separator
Cattle (Dairy Type)	Dairying
Coöperation	Milk (Babcock Test)

CREAMNUT. See BRAZIL NUT.



DETAIL OF THE CREAM SEPARATOR

CREAM OF TARTAR, OR POTASSIUM BITARTRATE, *po tas' ih um bi tar' trale*, a white, crystalline compound of tartaric acid and potassium, which exists in grapes, tamarinds, and other fruits. It is used in making that necessary household article, baking powder, and is prepared from the sediment in wine barrels called *argol*. This argol is dissolved in hot water, and the coloring matter is removed by means of clay or egg albumen. After being purified by crystallization, it is ready for the market. If cream of tartar could be made directly from the juice of the grape, without undergoing the foregoing process, it would increase the value of grape crops; a California association has offered a prize of \$25,000 for the discovery of a method of doing this.

Cream of tartar is also used in medicine as a purgative, in dyeing to fix colors, in the making of candies, and combined with sodium bicarbonate, it is the common substitute for yeast in baking. Argol finds an important use in the manufacture of the drug *atophan*, widely used in the treatment of rheumatism. See **BAKING POWDER**.

T.B.J.

Chemical Formula. The formula for cream of tartar is $\text{KH}(\text{C}_4\text{H}_4\text{O}_6)$, that is, a molecule contains

an atom of potassium and one of hydrogen, united to form the group KH , and four atoms of carbon, four of hydrogen, and six of oxygen. *K* stands for *kalium*, the Latin term for potassium.

CREAM SEPARATOR. Because the fat particles contained in milk are lighter than the liquid portion, they will rise to the surface if a quantity of milk in a dish or can is left undisturbed for a few hours, in a cool place. This method of securing a thick top layer of milk, which we call the cream, is too slow and unreliable for commercial purposes, and creameries and large dairies make use of a machine for separating the cream and milk. In cream separators we have a practical application of the principle of centrifugal force (which see). We all know that when a body is whirled rapidly, it has a tendency to fly off in a straight line, and that the heavier the body the stronger is the tendency. If a boy hurls a paper ball and a stone from a sling, the stone will be thrown much farther than the ball. In the separator, the milk flows into a bowl or drum, which is made to revolve at high speed. The heavier parts of the milk are thrown to the outer rim of the bowl, and the lighter cream collects at the center. There are two sets of collecting spaces and delivery spouts, so that

the cream and skimmed milk can be removed without mixing.

The parts of the machine are shown in the accompanying illustration. Separators may be operated by hand, electric, water, steam, or animal power, but mechanical power gives a more uniform rate of speed than manual or animal power, and the more even the turning, the better the results. F.W.D.

Related Subjects. The reader is referred to the references at the end of the article CREAMERY.

CREASY, *kre' sie*, EDWARD SHEPHERD. See FIFTEEN DECISIVE BATTLES.

CREATION, MYTHS CONCERNING THE. See MYTHOLOGY.

CRÉCY, *kra se'*, BATTLE OF, the first important battle of the Hundred Years' War (which see), took place in 1346. There the English forces of Edward III, numbering 19,000, totally routed a French army of 60,000, commanded by Philip VI. About half of the French army perished, and among the slain were over a thousand knights, the flower of the chivalry of France. The aged King John of Bohemia, who had fought for Philip, was also slain; his crest of three ostrich plumes and motto *Ich dien*, meaning *I serve*, were adopted by Edward's son, the Black Prince, the hero of the day. The Battle of Crécy is especially notable in that it proved the superiority of the common soldier to the armor-clad knight, and so contributed to the fall of feudalism and chivalry. It was also one of the first battles in which the English soldiers used gunpowder.

The town of Crécy, now famous as the site of this battle, lies in the department of Somme.

CREDIT. The gigantic structure of modern industry and commerce is based on credit. Credit is the lifeblood that nourishes all the great as well as the small undertakings we see around us. Without it, the building of railways, the development of natural resources, the establishment of great factories, the construction of large buildings, and the growth of utilities in towns would have been impossible.

Credit is primarily based on the confidence placed in the honor and ability of a purchaser or of a debtor to pay for his purchases at some future time, or to meet his obligations. This form of personal credit is illustrated in the so-called "trust," or book accounts, allowed by many retail merchants to their customers.

In large commercial transactions, credit is given upon the deposit of security, which usually takes the form of promissory notes, bills, drafts, mortgages, or bonds. These are called *instruments of credit*, and through them the creditor establishes claims to a portion of the debtor's estate and thereby assures himself of the repayment of his debt. Through a well-organized system of credit, it is possible

to carry on a great number of enterprises with a comparatively small amount of money. An effective organization of credit draws out wealth and increases its usefulness. It is in this way that modern banks play such an important part in the development of the industry and commerce of a country. Banks are reservoirs of credit. They collect wealth which lies idle in the hands of a great number of persons, and then loan it to those who can offer security for its repayment and are able to use it to the best advantage. See BANKS AND BANKING.

The term *public credit* signifies the confidence which men feel in the ability and disposition of a nation, state, county, or city to pay its debts. F.H.E.

Purchase on Deferred Payments. The last decade has witnessed a tremendous extension of credit in behalf of the householder, who in earlier days, unless financially well-to-do, was obliged to pay cash for his purchases. Possibly the first deferred-payment accounts were for the purchase of sets of books; such a plan was adopted by publishers many years ago; gradually, the list of articles which could be bought on small initial payments has increased until to-day it is probable that no article which contributes to human needs or desires is outside the range of deferred payments.

Economists are not agreed as to the effect of installment purchases on the credit system of the nation. There are those who declare that so much money is pledged before it is earned that the financial safety of families is endangered, and that should any considerable number of debtors fail to meet their obligations, creditor merchants might suffer losses so severe that many business failures might result.

On the contrary, bankers, who interpret conditions almost unerringly, are very generally of the opinion that the good intentions of the purchasing public are a guarantee of stability. These opinions take no account, however, of family tendencies to exhaust their incomes year by year, without making financial provision for old age. There is universal agreement that installment buying gives employment to hundreds of thousands of factory workers, who otherwise might be idle, in supplying the ever-increasing demands for manufactured products.

Derivation. The word credit is derived from the Latin verb *credere*, which means to trust.

CREDIT, LETTER OF. If a person is going to journey in a foreign country, he must arrange to have money at his command, wherever he may be. To carry gold and silver is out of the question, and for large amounts, notes and checks are often inconvenient. But if he carries a letter from a bank which says that up to a certain sum the bank will repay whatever

money a foreign bank may be asked to furnish, he may at any time draw an amount, large or small, which suits his convenience. Sometimes such a letter of credit is addressed only to one banker, but for tourists a more suitable form is the *circular* letter, good in almost any part of the world. The letter carries the person's description, so that if lost it is valueless to the finder. When money is thus obtained in a foreign country, the banker pays in the current rate of exchange (see EXCHANGE) and inscribes on the letter, both in the currency of his nation and in that of the tourist, the amount given. If at the journey's end, the sum named in the letter has not been exhausted, the balance is returned by the bank of issue.

Travelers' Checks. A comparatively recent innovation which is rapidly succeeding letters of credit is travelers' checks, issued by banking associations, banks, and express companies, and some tourist agencies. Travelers may buy these in denominations as small as \$10, and they are provided with all necessary safeguards as to identification. Once issued, they are used in foreign countries at designated banks or offices as readily as actual money. If lost, they are of no value to the finder. F.H.E.

CREDIT MOBILIER OF AMERICA, *kred'-it mo bel' yer*, the name of a joint stock company responsible for a serious political scandal in the history of the United States. Originally chartered by Pennsylvania in 1865 to do a general loan business, in the next year the company was purchased by the promoters of the Union Pacific. The railroad company had just been chartered by the government of the United States, which offered to give it a land grant valued at \$50,000,000, and to lend it \$16,000 to \$48,000 a mile for construction. Prominent among the railroad promoters were Oakes Ames, a Representative in Congress from Massachusetts, and John A. Dix, later governor of New York; these men realized that the government's subsidy and loan were approximately double the amount which would be required to build the road. To get all of this subsidy, they gave the contract for construction to the Credit Mobilier of America, of which they were the owners, and in payment for the work gave stock of the railroad company and the bonds issued by the government as a loan.

The plan worked well. Credit Mobilier stock was worth about five cents on the dollar in 1866; in 1868 the company's dividends amounted to 430 per cent. The consequent sudden rise in value led to quarrels among the promoters and finally to a Congressional investigation. Oakes Ames and others of the promoters, in an attempt to prevent the investigation, disposed of Credit Mobilier stock at less than half its market price to members of Congress and government officials, and even loaned them the

money to pay for it. These transactions were exposed in 1872, to the consternation of the country, which saw its Vice-President and other high officials convicted of accepting bribes. After much excitement, Congress censured two of its members and one of the government directors of the railroad, but no further action was taken.

Derivation of Name. The name *Credit Mobilier* was taken from that of a French banking firm which loaned money on movable—that is, personal—property. The Credit Mobilier in Paris was established in 1852, and was at one time a powerful organization, but the extravagant speculation of its promoters brought it to ruin in 1860, although the promoters made large fortunes.

CREDITOR. See BOOKKEEPING.

CREE. See INDIANS, AMERICAN (Most Important Tribes).

CREED, what one believes concerning a definite line of action or policy. If a man says, "I believe honesty is the best policy," that constitutes his business creed in dealing with others. Creeds are usually associated with religion, but they can just as appropriately be associated with any other beliefs. One may have a political creed or an educational creed, as well as a religious creed.

The creed of any Church contains the articles of faith which the communicants of that Church accept. From this viewpoint, there are as many creeds as there are religious denominations. All these, however, are derived from a few established by the early Church. The first is the Apostles' Creed (which see), so called because it is supposed to have originated with the Twelve Apostles. The next in importance is that adopted by the Council of Nice, called the *Nicene Creed* (see NICE, COUNCILS OF). Later, the Council of Trent and the Council of the Vatican added several articles to this creed, so that it included all the articles of faith of the Roman Catholic Church.

No other creeds were adopted until the Reformation, in the sixteenth century. As a result of that movement (see REFORMATION), the Lutheran Church has the *Symbolic Book of the Evangelical Church*; the Church of England has the *Thirty-nine Articles*, and the Presbyterian Church the *Westminster Confession of Faith*. The creeds of all Protestant denominations consist of modifications of one or more of these creeds, and they are practically the same in their main features.

Two Creeds. Following are two famed creeds, one particularly for teachers, by Edwin Osgood Grover, the other by William Henry Channing:

The Teacher's Creed

I believe in boys and girls, the men and women of a great to-morrow; that whatsoever the boy soweth the man shall reap.

I believe in the curse of ignorance; in the efficacy of schools; in the dignity of teaching; and in the joy of serving others.

I believe in wisdom as revealed in human lives as well as in the pages of the printed book; in lessons taught, not so much by precept as by example; in ability to work with the hands as well as to think with the head; in everything that makes life large and lovely.

I believe in beauty in the schoolroom, in the home, in daily life, and out-of-doors.

I believe in laughter; in love; in faith; in all ideals and distant hopes that lure us on.

I believe that every hour of every day we receive a just reward for all we are and all we do.

I believe in the present and its opportunities; in the future and its promises; and in the divine joy of living.

EDWIN OSGOOD GROVER.

My Symphony

To live content with small means; to seek elegance rather than luxury, and refinement rather than fashion; to be worthy, not respectable, and wealthy, not rich; to study hard, think quietly, talk gently, act frankly; to listen to stars and birds, to babes and sages, with open heart; to bear all cheerfully, do all bravely, await occasions, hurry never—in a word, to let the spiritual, unbidden and unconscious, grow up through the common. This is to be my symphony.

WILLIAM HENRY CHANNING.

CREEKS, an Indian confederacy. See INDIANS, AMERICAN.

CREEK WAR. See INDIANS (Creek).

CREEPER, the name of a family of small, busy birds much like the nuthatches in their habit of climbing trees. Most creepers are found in Europe, but the common *brown creeper* is also seen in North America, being especially abundant in Southern Canada. It is smaller than the sparrow, and its brown plumage, streaked with white, looks almost like the rough bark of the trees it climbs. It is grayish-white beneath, however. This active bird circles a tree from the base upward by means of its strong feet and twelve stiff tail feathers, and conscientiously picks from the bark, with its slender, curved bill and sharp-pointed tongue, every spider egg or insect it can find. Then it drops to the ground and works its way up another tree. Insect life and a few seeds constitute its only food, and it is one of the birds useful to man.



Photo Visual Education Service
BROWN CREEPER

The creeper has a "wild, sweet song," usually heard, however, only when the bird is making its nest of moss, feathers, and fine twigs, behind a piece of loose bark. It lays five to eight white eggs, spotted with brown. D.L.

Scientific Name. The creeper family is called *Certhiidae* in scientific language. The brown creeper is *Certhia familiaris americana*.

CREEPING BENT, a grass widely used for the greens of golf courses because of its softness, smoothness, and pliability. An American variety suitable for hay and pasture grows in the marshes along the seashore, but the form used for lawn grass is native to Europe. Creeping bent is so called from its habit of throwing out slender runners three or four feet long. It is a grass of delicate appearance, and bears dense flower clusters.

[The scientific name of the grass is *Agrostis stolonifera*.]

CREEPING CHARLIE. See LYSIMACHIA.

CREIGHTON, *kra' ton*, UNIVERSITY. See NEBRASKA (Education).

CREMATION, *kre ma' shun*, the act of burning bodies of the dead instead of burying them, a practice which has passed down the generations from prehistoric times. It has been long advocated throughout America and Europe, and many cremation societies have been organized. It is believed that Germany leads in the movement. Although the practice is objected to for sentimental reasons, and the Roman Catholic Church is actively opposed to it, its economic values are by no means small. Cremation lessens the spread of disease, and in some parts of the world removes the necessity of using for burial purposes land which is really needed for a growing population. Cremation, of course, removes all trace of crime, and for that reason is objected to by officials whose duty it is to enforce laws. Insurance companies, also, have found that proofs of death by poisoning, etc., have been removed by cremation and money may thereby be secured fraudulently. But the hygienic good tends to make the practice widespread.

The present method of cremation is as follows: After the name plate and handles have been removed, casket and body are placed in a specially constructed furnace and subjected to intense heat, 2,000° to 2,500° F., but not to direct flames. Where obtainable, gas is used as fuel, but coal is usually employed. After a few hours, the casket and clothing have changed to gaseous products and light ash, and about four pounds of pure bone ash remain. The latter is placed in an urn, sealed and labeled, and delivered to relatives of the deceased. The building in which cremation takes place is called a *crematorium*; it is usually located in a cemetery; nearly every large city has at least one. See BURIAL.

CREMAZIE, OCTAVE. See CANADIAN LITERATURE (French Canada).

CREOLE, *kre' ohl*, a term applied to the descendants of Portuguese, Spaniards, and Frenchmen born in the West Indian Islands, the southern parts of the United States, the island of Mauritius, and other sections of the world colonized by Spain or France. The term implies purity of this European stock, unmixed with that of other people, and must not be confused with mulatto (which see). C.W.

CREOLE STATE, one of the popular names applied to Louisiana (which see).

CREOSOTE, *kre' o sole*, a heavy, oily liquid, nearly colorless when pure, obtained by distillation from wood tar. The product found in the markets is usually of a brownish color. That extracted from beechwood tar has been found most desirable. Creosote is an antiseptic, and is used medicinally and as a preservative in the preparation of smoked meats. In dilute form, it is applied locally in dentistry and surgery, and is a well-known remedy for relief of toothache. In chronic bronchitis and tuberculosis of the lungs, creosote is administered to clear the passages and relieve coughing. Physicians no longer believe, however, that it kills the tubercle bacilli. It should never be taken except as directed by a physician. Creosote has a penetrating, smoky smell, a property that makes it useful in neutralizing disagreeable odors.

[Creosote obtained in the distillation of coal tar is extensively used to preserve railroad ties, fence posts, and other timber. See COAL TAR.]

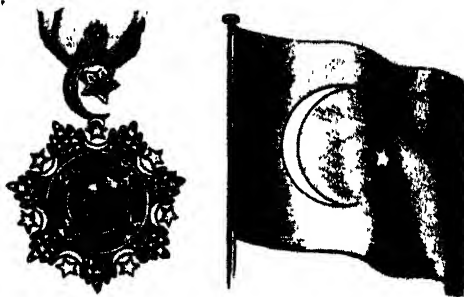
CRÊPE, *krape*. See CRAPE.

CRESCENDO, *kreh shen' doh*. See MUSIC (A Course of Lessons).

CRESCENT, *kres' ent*, a universal symbol of growth and progress, and, in one instance, of governmental power. Its use as such was inspired by that beautiful thing of the heavens, the curved, silvery, crescent new moon. The moon goddesses worshiped by the Egyptians and the Greeks were decorated with the crescent symbol. Athenians and Romans of high rank were permitted to wear crescents of silver and ivory.

The crescent was the emblem of the ancient Greek city Byzantium, which became Constantinople. After the establishment of the Turks in Europe, especially after 1453, when Constantinople was captured, it was the universal emblem of their empire, the crescent and a star in white on a red background constituting the Turkish flag. The Order of the Crescent, a Turkish order of knighthood, was instituted in 1799 by Sultan Selim. The crescent was retained in the flag of the new National State of Turkey. As the cross is the emblem of Christianity, so is the graceful crescent the emblem of Mohammedanism. The Red Cross banners

of other countries were not adopted by the Turkish Red Cross Society; its banner bears the red crescent on a white field.



THE CRESCENT

At left, emblem of the Turkish Order of the Crescent; at right, the merchant flag of Turkey, described in accompanying article.

Crescent City, a nickname for New Orleans, came into use because formerly most of the city lay in a great crescent-shaped bend of the Mississippi River.

CRESS, the name applied to several plants of the mustard family, whose pungent-flavored leaves are used as salad or garnishing. Watercress, the best-known species, is, as its name indicates, an aquatic plant. The smooth, bright-green leaves, on long, slender stems, are everywhere prized as a winter salad or meat garnish. Watercress can be grown without difficulty in ponds of running water, but must be kept away from muddy bottoms. *Common*, or *garden cress*, also called *peppergrass*, has a somewhat sharper taste than watercress, and is often mixed with milder-flavored salad plants as well as used as a garnish. It is an effective remedy for scurvy. This species grows well in cool, moist garden soil. Other species include *winter cress*, which is served in Sweden as a boiled vegetable; *American cress*, and *Virginian cress*, the latter of which is used in some parts of North America as a medicine to increase perspiration. B.M.D.

Scientific Names. These plants belong to the family *Cruciferae*. Watercress is *Nasturtium officinale*; garden cress, *Lepidium sativum*; winter cress, *Barbarea vulgaris*; American cress, *B. praecox*, and Virginian cress, *Lepidium virginicum*.

CREST. See HERALDRY.

CRESTED REDBIRD. See CARDINAL BIRD.

CRETACEOUS, *kre ta' shus*, **PERIOD**, the final period of the Mesozoic Era, succeeding the Jurassic and succeeded by the Tertiary Period. The name, which is from the Latin, means *chalky*, and refers to the great chalk beds of England and France. The period comprised two epochs, commonly called the *Lower* and *Upper Cretaceous*, which some geologists rank as separate periods, naming the earlier

one *Comanchean*, and reserving the name Cretaceous for the later one.

Cretaceous strata are widely distributed throughout the world, but, in spite of the name, are not generally marked by thick beds of chalk. The rocks, which are partly marine and partly fresh-water deposits, consist of limestone, sandstone, clay, sand, gravel, and some beds of lignite, but the last-named are too small to be of commercial value. The life of the period was marked by the continuance of dinosaurs, flying reptiles, and birds with teeth, and by the appearance of several still existing species of broad-leaved trees, such as birch, oak, walnut, and maple. L. La F.

Related Subjects. The reader is referred in these volumes to the following articles

Chalk	Jurassic Period
Dinosauria	Mesozoic Era
Geology	Tertiary Period

CRETE, *kreet*. Below the southern end of the Aegean Sea, about sixty miles from the Grecian mainland and not quite twice as far



LOCATION MAP

from the shores of Asia Minor, lies the island of Crete. Three thousand years ago Ulysses thus described it to Penelope:

Crete is a region lying in the midst
Of the black deep, a fair and fruitful land,
Girt by the waters. Many are the men,
Nay, numberless, who make it their abode,
And ninety are its cities. Different tongues
Are spoken by the dwellers of the isle

Centuries before Homer's time, Crete was the home of kings whose fleets held sway over the eastern Mediterranean, and of a people whose civilization influenced Egypt, Syria, Greece, Sicily, and even the Adriatic lands about Venice. Cretans taught the Phoenicians, the fathers of our alphabet, how to write.

The island is about 160 miles long and has an area of 3,365 square miles. Its mountains run from end to end, rising to a height of 8,000 feet in Mount Saint Theodore and Mount Ida, famed in Greek mythology as the birthplace of Jupiter. The three chief towns are Canea, Retimo, and Candia. Near the last was—

Cnossus, where the monarch Minos dwelt,
He who at every nine years' end conferred
With Jove Almighty.

Among the ruins of Cnossus is the great labyrinth built by Daedalus, where events actually occurred which gave rise to the legend of Theseus and the terrible Minotaur. So wonderfully was the ancient city constructed that its stone sewers, now 4,000 years old, are still fit for use.

Since 1912 Crete has been a part of Greece. Once it was included in the Roman Empire, then fell successively under the rule of Byzantines, Venetians, Turks, and Egyptians. In 1840 it became Turkish again, but because most of its 350,000 people are Christians, there was continuous anarchy, and in 1808 the Turks gave way to a high commissioner of England, France, Italy, and Russia. The people demanded, and several times proclaimed, union with Greece. Eleutherios Venizelos, their leader, became Premier of Greece and organized the Balkan League against Turkey; in the ensuing war, Cretans fought beside Greeks, and in 1913 the powers retired in favor of Greece.

Candia, the capital, has a population of 25,000. It has a very ancient history, dating back to the days when it was known as Heracleum. The modern town was founded by the Saracens, in the ninth century. In the twelfth, it belonged to Genoa, and later was an outpost of Venice. Further details appear in the article above.

Related Subjects. The reader is referred to the following articles in these volumes

Ariadne	Minos
Daedalus	Minotaur
Jupiter	Theseus
Labyrinth	Venizelos, Eleutherios

CRETIN, *kre' tin*. See GLAND (Ductless Glands).

CRETINOIDS, *kre' tin oidz*. See CHILDHOOD, BEHAVIOR IN.

CRETONNE, *kre' tahn'*, originally a soft, white hemp and linen cloth, now a cotton cloth made of fairly heavy yarns, in a plain or corded weave, on which an attractively colored pattern is printed. Floral designs usually are the most popular, and are printed on a white or colored background, sometimes each side having a different pattern. In cheaper cretonnes, the thick threads used are commonly formed of waste cotton.

The word *cretonne* comes from Creton, a village in Normandy, where this cloth originated. Whole rooms often are decorated with this material, from window hangings to the furniture covering, scarfs, tray linings, etc. It is also used for bags of many varieties—laundry bags, hat bags, work bags—and for garden dresses and aprons.

CRIBBAGE, *krib' aje*, a popular game of cards which requires careful calculation and observation. A full pack of fifty-two cards is used, and the players may number two, three, or four. The most popular game is between two players. When cards are cut to decide who shall deal, six cards are then dealt to each

player. The remaining cards are cut, and one card is placed face up on the table as the "turn up." Each player in turn takes out two cards, which he places face down on the table to form the *crib*. The object is to make a score of sixty-one by means of *pairs*, *sequences*, *fifteens*, and the *go*. Court cards, or face cards, count ten, other cards according to their pips, or spots. A specially constructed board drilled with two rows of sixty holes and a "game hole" is used to facilitate the keeping of scores. As each point is made during the game, wooden pegs are moved along into the holes.

The non-dealer plays a card, calling its value as he does so. For example, he may start with the nine of diamonds, saying "nine" as he lays it down. The opponent, when the nine is played, may put down another nine and claim two for a pair, or he may play a six and claim two points for making fifteen. Whatever card he plays, its value is added to the other cards played until thirty-one is reached, or until the opponent cannot play without running beyond that number. The player who approaches nearest to thirty-one is entitled to one; if he runs up thirty-one exactly, he scores two. A sequence consists of a run of three or more cards, and one point for each card is claimed. If all the cards in a hand are of one suit, a flush is claimed, and one point is marked for each card. When all cards have been played, the non-dealer counts the points in his hand, counting two for each combination of fifteen, two for each pair, and so on. The turn-up card may be used in any combination, and is added for counting purposes to the cards of each player. The dealer then does the same with his hand, and also with the crib, consisting of the cards taken out of the two hands and the turn-up card. If a knave is turned up after dealing, the dealer claims "two for his heels." If a player holds the knave of the same suit as the turn-up card, he claims "one for his nob."

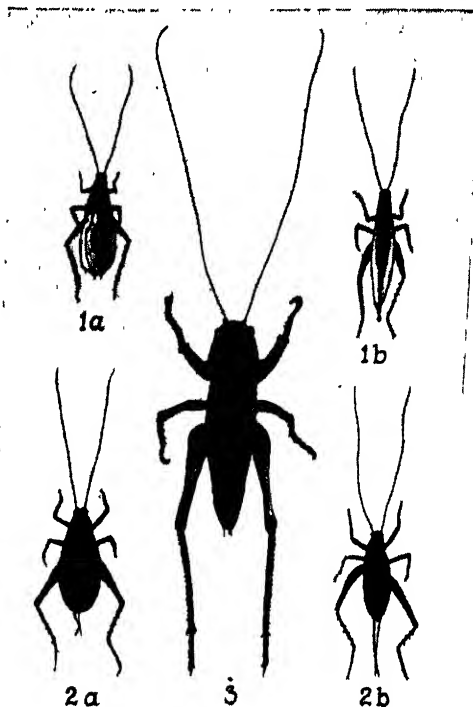
CRICKET, a blackish or brownish insect, about an inch long. Its merry *re-leaf, re-leaf*, has been characterized in literature by Burroughs as a "rhythmic beat," by Thoreau as "slumbrous breathing," and as "audible stillness" by Hawthorne, who adds, "If moonlight could be heard, it would sound like that." This little insect likes a warm home in the crevices of old-fashioned fireplaces, so it has become associated with the crackling fire and the steaming kettle. Cowper describes its tune as—

Sounds inharmonious in themselves and harsh,
Yet, heard in scenes where peace forever reigns,
And only there, please highly for their sake.

In Dickens' beautiful Christmas tale, *The Cricket on the Hearth*, one of these chirping creatures sings only when things are running

smoothly, but in times of sadness and trouble is silent.

It is the male cricket which produces sound. A filelike ledge on one wing is rubbed on a rough surface of the other. When it is not call-



VARIOUS CRICKETS

(1a) Yellowish tree cricket, male, and (1b) female.
(2a) black tree cricket, male, and (2b) female.
(3) katydid.

ing to its mate in that way, the wings are folded along its flat back. The hearing organs of these insects are located in their legs. Crickets have feelers, or antennae, longer than their own bodies, ordinarily appearing as in the illustration. During the day they remain in the

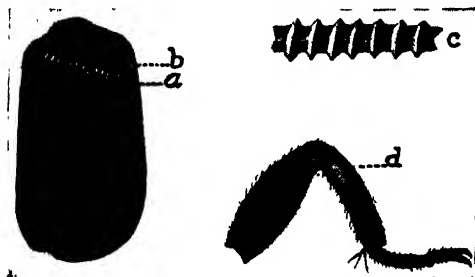


GOSSIPING IN THE BACKYARD

ground, going forth at night for their plant food. Like grasshoppers, they leap quickly from place to place.

The *common*, or *true*, *crickets* described above include those found throughout America in neglected fields and in old straw, and the

house crickets of Europe, which are also common in Canada and in the Northeastern United States. In autumn they lay their eggs in



INTERESTING PARTS OF THE CRICKET

At left, wing of male cricket, much enlarged; (a) file, (b) scraper. At right: (c) File; (d) front leg, enlarged, showing ear at d.

pockets of the earth, to hatch in the spring. There are other species of crickets which differ in color and form, such as the *mole crickets* (which see), with legs developed for burrowing, and *tree crickets*, whose habit of laying eggs in stems of raspberry and blackberry plants and in grape vines causes much damage. W.J.S.

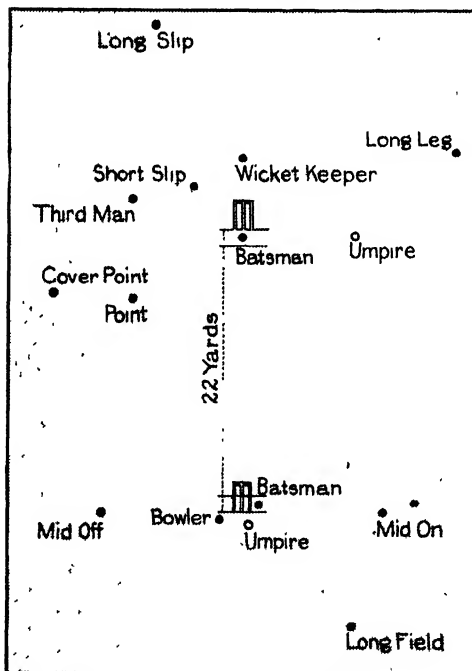
Classification. Crickets comprise the family *Gryllidae* in the order *Orthoptera* (which see). They are related to cockroaches and grasshoppers.

CRICKET, the English national game, popular in Canada, Australia, and all other British territory, and also played in some parts of the United States. It is of ancient origin, but its present name dates from about 1685. Although it requires much of the skill of baseball, it lacks for Americans many of the attractive features of that game, and as far as the American spectator is concerned, it is lacking in interest and excitement. The game is played on a level turf field by two teams, consisting of eleven players each. At a distance of twenty-two yards apart, two wickets are erected. These wickets consist of three stumps, twenty-seven inches in height, with two pieces of wood, called *bails*, placed across the top. The stumps are placed sufficiently near each other to prevent the ball from passing between them.

How the Game Is Played. The team which takes the bat, determined by lot, posts one batsman at each wicket. The other team sends in a bowler; the remaining men are placed in the field in positions most suitable for stopping or catching the ball when struck by a batsman. The bat is thirty-six inches in length, twenty-two inches being taken up by the blade, which is four and one-half inches wide. The handle, about the thickness of the handle of a baseball bat, is fourteen inches long and made of pieces of cane spliced together. The regulation size and weight of a cricket ball is nine inches in circumference and five and

one-half ounces in weight. Two umpires are appointed, one standing near each wicket, to watch the game and give decisions when appealed to. Unlike baseball, the rules of cricket demand that no umpire shall call a man out or give any decision, except in answer to a direct appeal. The bowler takes the ball and bowls it against the wicket opposite him, in front of which stands a batsman. The object of the bowler is to make the ball hit the stumps, which the batsman defends by merely stopping the ball with his bat or by driving it into a distant part of the field. The wicket keeper and the batsman protect their legs with pads and their hands with gloves, but those in the field, whether infield or outfield, must catch or stop the ball with their bare hands.

If the batsman sends the ball out into the field, he runs to the opposite wicket and changes place with the other batsman. If he reaches the wicket before the ball is returned, he scores a "run." Also it is possible to score runs if the *wicket keeper*, who acts as the "catcher," standing behind the batter, fails to stop a ball that has passed the bat without disturbing the wicket. When six balls have been bowled at one end, the umpire, standing near the bowler, calls "over." Then the bowler at the other



THE CRICKET FIELD

end takes the ball, and the game proceeds in the same way. A batsman is "out" (1) if the bowler delivers a ball which passes his bat and strikes the wickets; (2) if he strikes a ball and



Photos. Visual Education Service; OROO

TWO OLD METHODS OF PUNISHMENT OF CRIME

At left, an historic gallows of the Incas (see INCA), in Bolivia, where offenders were hanged. At right, old stocks and whipping post in England; these two forms were introduced into the American colonies.

it is caught on the fly; (3) if while he runs from wicket to wicket the ball is thrown to the base, as it were, and the stumps are disturbed before he reaches safety; and (4) if he leaves, for any purpose, a certain portion of ground in front of his wicket, marked off by white lines called *creases*. The creases also serve as a box for the bowler. If the ball is delivered from outside the crease, the batting side may claim a penalty of one run. If a batsman places any part of his person in front of the wicket, allowing a ball which would otherwise have hit the stumps to hit him, he may be declared out. When all the batsmen of one side have been declared out, the opposing side takes the bat. A complete game consists of two innings for each side; whichever scores the largest number of runs is declared the victor. The game is so slowly played that it is seldom possible to complete the two innings in the time allotted; in this event, the game is usually awarded to the highest score in one inning. In important matches, such as those between counties, three days are allowed for a game, to insure its completion.

Ethics of Cricket. The utmost ceremony is observed in the progress of the game. The opponents must be given fair play, and nothing whatever that could put a player off his game or embarrass him would be tolerated. Many

appeals have been made to the leading English cricket clubs to make alterations that would quicken the game and add to the spectators' interest. All such appeals have failed, because as one noted player remarked, "It would not then be cricket."

In Canada, cricket has suffered to a certain extent by the competition of baseball, which is growing in popularity in the Dominion; but there are many excellent clubs, which produce teams that can hold their own with some of the best in England. The game of cricket has probably reached its greatest stage of perfection in Australia, where, on account of the climate, it may be played all the year.

CRICOID CARTILAGE, *kri' koid kahr' til-aje*. See LARYNX.

CRIME, any offense against the peace, order, or laws of a state. Such acts as burglary, arson, forgery, bribery, counterfeiting, and murder are obviously injurious to the welfare of society. There are other crimes, however, which are not direct acts of commission; an act of omission, or failure to do a required thing, may be a crime, if injury results. For example, a factory owner may neglect to provide fire escapes on his building. His factory may burn, and the lives of employees may be lost. He actually did nothing to cause the disaster, yet the law may declare him guilty of

manslaughter. As a general rule, a crime of omission is an act which would not be a crime if it were not especially declared so by statute, whereas a crime of commission is obviously shocking and harmful.

The Essential Elements. The first essential element in any crime is *criminal intent*. The law considers the intention of the person, on the basis of the evidence. An act of violence, even murder, is not a crime if it is committed in self-defense or as the result of an accident, or if it is committed by a public officer in the discharge of his duty. The law, too, regards certain classes of persons, such as young children, imbeciles, and lunatics, as incapable of having criminal intentions, but criminals of the latter two classes are placed in asylums, by court decree. In certain circumstances, a crime committed under compulsion is considered justified. The phrase *criminal intent*, therefore, is somewhat misleading, for the courts really consider all the evidence and the obligation of an individual, as well as his intention, in fixing responsibility.

Definition of Crime. This has varied greatly in different ages and in different countries. Even to-day there are many acts which are counted crimes in one land and not in others. In the early stages of society, all wrongs against individuals were considered matters for private vengeance. The modern idea is that, since the state guarantees protection to all its citizens in the pursuit of life, liberty, and happiness, any offense which threatens the security of all members of society becomes a matter for public concern, even if aimed against an obscure citizen. If the injury is not strictly anti-social in character—like trespass or false imprisonment, for instance—it is called *tort*, or private wrong, and is punishable by civil law (see TORT). There are some acts, such as assault and battery, which may be prosecuted both by the state under criminal law and by the individual under the law of torts.

Three classes of crimes are recognized in common law—*treason*, *felonies*, and *misdemeanors*—although the present tendency is to class treason under felony. Felonies are crimes which are punishable by death or imprisonment in a state prison for more than one year. All other offenses are included under the head of misdemeanors and are punishable by fine only, by a short term of imprisonment in a jail, or by both fine and imprisonment.

Criminal Law. Criminal law defines public wrongs, or crimes, and endeavors to mete out punishment according to the degree of guilt, just as civil law protects against private wrongs. The tendency of present-day criminal legislation is away from the old idea of retribution or wrong-doing and toward the newer idea of reforming the criminal and protecting society.

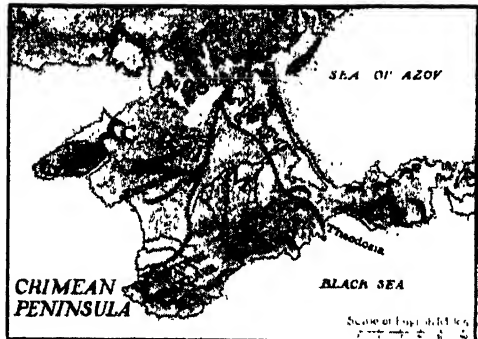
The criminal law has a certain elasticity by means of which the presiding judge is given considerable power of discretion in regard to the sentence. That is to say, the law prescribes a maximum and a minimum penalty, and upon the judge is placed the responsibility of deciding the degree of the prisoner's guilt. This naturally leads to a great lack of uniformity in the allotment of prison terms. There has been adopted in many jurisdictions what is called the indeterminate sentence, and many of the more advanced states are passing new laws which aim at keeping the criminal under treatment in prison until he is pronounced fit for freedom.

F.D.F.

Related Subjects. The following articles in these volumes should be read in connection with the topic of crime. There will also be found under LAW a number of closely related articles:

Abduction	Fraud
Arson	Homicide
Assassination	Indeterminate Sentence
Assault and Battery	Kidnaping
Bigamy	Larceny
Blackmail	Law
Blasphemy	Manslaughter
Bribery	Mayhem
Burglary	Misdemeanor
Capital Punishment	Murder
Conspiracy	Peace, Breach of the
Counterfeiting	Piracy
Criminology	Procedure
Embezzlement	Robbery
Felony	Smuggling
Forgery	Treason

CRIMEA, *kri mc' ah*, a peninsula in the southern part of Russia, is an autonomous republic within the Russian Soviet Socialist Fed-



THE CRIMEA

eral Republic. It is almost entirely surrounded by the Black Sea and the Sea of Azov. The neck of land joining it to the mainland, called the Isthmus of Perekop, is penetrated by a canal seventy feet in width, so the Crimea has artificially become an island. It covers a total area of 15,060 square miles, and is therefore a little larger than the state of Vermont and not quite half the size of Nova Scotia. It has a population of about 761,600. The land gradually rises from the sea in a series of steppes,

the northern slopes of which yield splendid crops of grain and hardy fruits. In the south the valleys are luxuriant with vines, figs, olives, mulberries, and other fruits, while the flowers rival in beauty those of the Mediterranean shores.

The Cities. There are two cities which have played important parts in the history of the Crimea: Balaklava, where the charge of the "Light Brigade" was made (see BALAKLAVA, BATTLE OF), and Sebastopol, interesting historically and commercially.

Sebastopol, *se bas' toh pohl*, famous as the scene of one of the greatest sieges in history (see *Crimean War* below), is situated on an inlet of the Black Sea, in the southwestern part of the Crimean peninsula. Its magnificent harbor has become the most important naval station in Southern Russia. It is now exclusively a naval port, having been closed to commerce and its trade diverted to Theodosia, Nikolaiev, and Kherson. Since the close of the Crimean War, in 1856, the city has been practically rebuilt, and now contains handsome buildings and extensive docks. The principal industrial establishments are the ship-building yards. This city was bombarded by the Turks during the World War. Population, about 68,000.

Crimean War (1854-1856), the name given to a great struggle between Russia on the one hand and France, England, Sardinia, and Turkey on the other, to resist Russian aggression in Europe. It had for years been the policy of England to maintain the Turkish Empire in its integrity, rather than let Constantinople fall into the hands of a more progressive power. Russia had long cast its eyes on Turkey as the logical southern extension of its empire, to give it its long-desired Mediterranean outlet to the ocean on the south. Nicholas I, in accordance with the policy laid down by Catharine II, endeavored to proclaim a protectorate over Serbia, Bulgaria, and Bosnia, with the avowed object also of occupying Constantinople. Such movements were held to endanger what is termed the "balance of power," and when Russia assumed the aggressive, Turkey, followed by England, France, and Sardinia, declared war.

After a demonstration in the Baltic Sea, it became evident that the war must be decided in the Crimea. The chief military events were the battles of the River Alma, of Balaklava (see CHARGE OF THE LIGHT BRIGADE), and of Inkerman, and the capture of Sebastopol. The siege of Sebastopol, successfully concluded late in 1855, led to the complete defeat of the Russians. By the terms of peace, arranged in Paris and signed on March 30, 1856, the integrity of the Turkish Empire was guaranteed, and the Russians renounced their ambitious policy. See PARIS, TREATIES OF (1856).

CRIMINAL INTENT. See CRIME, above.

CRIMINOLOGY, *krim ihn ol' o jie*, a social science which covers the subject of crime in all its aspects. It includes the evolution, causes, and classification of crime; statistics showing how it varies in different countries, ages, and seasons; the history, surroundings, habits, and nature of individual criminals; means of preventing and lessening crime, and the administration of the machinery for dealing with criminals, repre-

sented by laws, courts, jails, prisons, workhouses, reformatories, industrial schools, and the like. Thus it overlaps and merges with sociology, ethics, psychology, mental and physical hygiene, the study of heredity—in fact, the whole science of man.

Lombroso, the Pioneer. As a science, criminology had its beginnings in 1876, when an Italian professor, Cesare Lombroso (1836-1909), published his famous work entitled *Criminal Man*. After close study of a large number of prisoners, he announced his belief that a criminal is not a normal, civilized man, but belongs to a special type that reverts to the primitive savage state. To describe this class, he originated the term *criminal by nature*, or *by instinct*. By way of proving his theory, he made a detailed analysis of the physical characteristics of the criminals he had observed, and pointed out that certain abnormal features were common to all, whatever their nationality. Among these he cited the large, prominent jaw, retreating forehead, peculiarly shaped head and ears, heavy hair, early wrinkles, and scanty beard.

Lombroso's work aroused much criticism, but it had the great merit of starting investigation. His opponents argued that if a man committed murder because of a barbarous nature for which he was not to blame, it would not be just to hold him to account; and that this view allowed no hope of reforming criminals through right prison training or of lessening crime by giving children the proper education and environment during the character-forming years.

Classes of Criminals. Later investigation and statistics have shown that only about ten per cent of the criminal class can be put in Lombroso's group of *born criminals*. The great majority come under the heads of *occasional criminals*, that is, those yielding to temptation or opportunity, and *professional criminals*. *Insane criminals* constitute a special group, on which borders also the large class of *mental defectives*. The least abnormal division is that of *criminals by passion*, which includes those whose criminal acts spring from some sudden blinding passion, such as anger, jealousy, or avarice.

Some Causes of Crime. Want has been called "the mother of crime"; poverty is a large factor in the problem, particularly in cities, where its contrast with wealth is so sharply emphasized. Statistics show that crimes against property are most numerous in cold seasons and cold climates, and that they increase with "hard times" brought on by strikes, wars, business crises, and the like. The largest percentage of crime is naturally among those without regular trade or employment. The last factor links itself logically with ignorance, another tremendously important cause of crime.

It is significant that the higher we go in the scale of education and occupation, the smaller the ratio of criminality becomes.

The French philosopher La Bruyère once wrote: "If poverty is the mother of crimes, want of sense is the father of them." In defying law and order, the criminal proves himself lacking in balance and ability to adapt himself to his social environment. Every insane or mentally defective individual is a potential criminal. A report of the Virginia State Board of Charities, based on five years of careful study, indicated feeble-mindedness in sixty per cent of the jail population of the state, and in sixty-eight per cent of all children passing through its juvenile courts and industrial schools.

Vicious environment is a fruitful source of criminality, and environment in turn is the outgrowth of existing social and economic conditions. However, it is the feeble-minded who are most susceptible to the influence of evil associates and surroundings. Drunkenness, together with illicit sale of liquor, is responsible for a large proportion of crime; this vice not only acts directly, but creates future criminals among the rising generation.

Among other causes of crime may be mentioned crowded living conditions, political corruption, and sensational newspaper stories of crime; for notoriety appeals to the vain and abnormal nature of the criminal. It is also a proved fact that very hot weather and hot climates engender crimes, particularly those against the person, the extreme temperature having an exciting effect upon the emotions.

Protection Against Crime. The great principle which the science of criminology has developed is that the aim in the treatment of crime should be *help*, not punishment; the means, *education* and *hope*, not intimidation. Ruskin said, "Punishment is the last and worst instrument in the hands of the legislator for the prevention of crime." Z. R. Brockway, the man who made the Elmira (N. Y.) Reformatory a practical experimental laboratory for prison-reform methods, declared, "The history of criminal punishments, the world over, shows that the most crimes accompanied the greatest severity." Protection and prevention are the true safeguards. Society must protect itself against the possible crimes of the insane and the feeble-minded, by caring for them in institutions.

Again, it must protect itself against the further crimes of convicted criminals by reforming the reformable through a many-sided prison training, covering mental development, moral suggestion, physical culture, and practical instruction in some trade. But it protects itself primarily by going to the very root of the trouble and preventing crime by assuring every boy and girl an education which will train both

body and mind; which will lay the foundations of good habits and sound character; and which will teach the child either a trade or a profession, so that he may become a self-supporting and self-respecting citizen. There is an approach to fact in the remark that "with every school we erect, we tear down a prison."

Habit and Home Influence. Reformation is the ideal course with the convicted criminal. Formation of upright character and good habits is the groundwork which will make reformation unnecessary. If the right habits are once implanted, they will form a wall blocking the way to evil; whereas, says one writer, "the slipshod habit, the lazy habit, the deceitful habit, early formed, often lead straight to the penitentiary." Mental and moral habits that affect the entire life of a man or woman are formed during the early years of childhood, when the mind is plastic. Thus the responsibility for laying the foundations of fine manhood and womanhood rests primarily with the home and the parents.

Modern Ideals and Reforms. The new methods of treating crime and criminals all take root in the principle that the purpose of separating the criminal from his fellows and taking away his liberty is to give him a chance to be "cured" and made fit to take his place in society. It is realized, however, that young prisoners are the most hopeful subjects for reformatory methods, and the reforming prison usually accepts none above a certain age. The greatest advances along reform lines have been made in the United States, first in the Auburn State Prison, the Elmira Reformatory, and at Sing Sing prison, all in the state of New York.

The probation system for first offenders, the classification and segregation of prisoners, the indeterminate sentence, prison self-government, the honor system, parole, prison farms, juvenile courts, the "child rescue" and "big brother" movements, special colonies for the cure of habitual drunkards or drug victims, and various related innovations are among the outstanding features of the great reform movement. The *indeterminate sentence* has been termed "a sentence to reformation," as it implies that the criminal shall not serve a definite term set by the court, but shall remain under prison treatment until he is pronounced no longer dangerous to society. This is similar to keeping a hospital patient under treatment until his health is restored.

Related Subjects. The following articles in these volumes will be of interest to the reader who desires to learn more of the general topic of criminology:

Courts	Juvenile Court
Crime	Morals Court
Ethics	Parole
Heredity	Prison
Indeterminate Sentence	Sociology

CRINOIDEA, *kri noi' de ah* See SEA LILIES

CRINOLINE, *krin' o lin*, from two Latin words, *crinis*, meaning *hair*, and *linum*, meaning *thread*. was the name applied to a cloth made on a linen woof, or foundation, with horsehair for threads. The resulting fabric was very stiff and wiry, and during three-fourths of the nineteenth century was used to make underskirts, to extend the enormously wide skirts of those days. Later, a framework of steel wire and tapes, called by the same name, supplanted the starchy petticoat-like garment.

A modern material of the same name is made of cotton gauze stiffened with glue. It is more closely woven than buckram, and is used for linings and hat frames.

CRISTOFORI, *kris toh fo' rie*, BARTOLOMEO, inventor of the pianoforte. See PIANO.

CRITTENDEN COMPROMISE, *krit' en-den kom' pro mize*, a measure submitted to Congress in 1860 by Senator John Crittenden, who hoped thereby to prevent the Southern states from seceding from the American Union. This compromise, which failed of passage, provided for the adoption of five amendments to the Constitution, as follows:

(1) That the right to hold slaves be recognized, and that slavery be permitted and protected in all the territory south of $36^{\circ} 30'$, and be prohibited north of that line. New states entering the Union should have the right to decide for themselves whether or not slavery was to prevail

(2) That Congress should not have power to abolish slavery in those sections under its exclusive control which were within a slave-holding state

(3) That Congress should have no power to abolish slavery in the District of Columbia so long as it existed in Maryland or Virginia, and that if slavery should ever be abolished in the District, the slave-owners should be compensated for their loss

(4) That Congress should be prohibited from hindering the carrying of slaves from one state to another or to a territory where slavery was legal

(5) That Congress might provide that the United States compensate slave-owners whose escaped slaves were rescued from pursuit. The Federal government in turn could recover damages from the county in which the rescue of a slave occurred

CROATAN, *kro tan'*. See DARE, VIRGINIA (The Lost Colony of Virginia).

CROATIA, *kro a' she ah*, AND **SLAVONIA**, *sla vo' ni ah*, formerly a crownland within the Dual Monarchy of Austria-Hungary, constituting a self-governing state of Hungary. After the dismemberment of Austria-Hungary through Austrian defeat in the World War, Croatia and Slavonia, with some additional territory, became a province of the new Kingdom of the Serbs, Croats, and Slovenes, renamed Yugoslavia in 1929. Politically, the province is governed as a single unit; geographically, it consists of two sections—Croatia, in the west; and Slavonia, in the east. The total area is 16,920 square miles, and the population is about 2,800,000. For boundaries, physical

features, and other information, see the article YUGOSLAVIA. See, also, AUSTRIA-HUNGARY, HUNGARY.



LOCATION MAP

Croatia and Slavonia, in black.

CROCKETT, *krock' et*. DAVID (1786-1836), one of the six great scouts of pioneer days in America, also a soldier and a politician, unlearned but shrewd and skilful. His maxim, "Be sure you are right, then go ahead," will live through the ages. He was born in Limestone, Tenn., and his training was that of the wild frontier, typical of the early nineteenth century. He ran away from home on his fourth day at school and did not learn his letters until he was eighteen years old. Under General Andrew Jackson he took part in the war against the Creek Indians. In 1826 he was elected to Congress, and again in 1828 and 1832, and in Washington his strange manner and dress attracted considerable attention. Upon retiring from Congress, he joined the Texans in their war for independence. At the Alamo, in 1836, he was one of the heroic group of defenders who were massacred by the Mexicans. The brave defense of this building is related more fully under the title ALAMO.

Attributed to Him. Several crudely witty books are said to have been written by Crockett—*A Narrative of the Life of David Crockett, A Tour to the North and Down East*, and *Exploits and Adventures in Texas*.

CROCODILE, *krok' o dile*. This flesh-eating reptile so nearly resembles the alligator that many persons cannot distinguish between them. The crocodile is more highly developed, however, and has other characteristics which differentiate it. The head of a crocodile is more narrow than that of an alligator, and the snout is pointed instead of rounded. Other points of distinction are its olive color with blackish markings, the more vertically flattened tail, and its longer and more pointed teeth, the lower fourth tooth being enlarged and fitted into a groove at the side of the upper jaw. As it is only about two-thirds as heavy as an alligator,



Photo U & U

NILE RIVER CROCODILES

These animals were photographed through the glass sides of their home in the London (Eng.) zoo

the crocodile is much more agile. The length of various species ranges from ten to twenty feet.

The crocodile has webbed feet, and ears and a snout fitted for life in the water. Like the alligator, it lives on fish, birds, and mammals, and a species in India and Africa is feared because of its fondness for human flesh. There the short, loud bark or croak of the crocodile fills natives with terror. The crocodile of India, which infests rivers like the Ganges, differs slightly in appearance from the American species, its snout being narrower.

Most of the true crocodiles inhabit the warmer parts of the eastern hemisphere, but three species are found in North and South America, being especially abundant in Mexico and Central America; one species lives as far north as Florida.

Crocodiles are caught in various ways. A popular method is to place crossed spiked sticks in bait. When the animal swallows the bait the act holds its jaws shut, and the spikes stick tight, so that the animal can be pulled out of the water and roped. Hunters also creep up on sleeping crocodiles, beat them insensible with heavy clubs, and so secure their prey. The horny, plated armor of the animal is impenetrable by bullet or spear, but the skin underneath is tender. The crocodile can be shot only through the eye. The eggs of the

crocodile, buried in sand or mud, are left to be hatched by the sun's heat alone. Crocodiles of the Nile were worshiped by Egyptians in olden times, and their bodies were preserved almost as carefully as those of human beings. Crocodile skin and fat are articles of consider-

able commercial importance; the musk glands are taken for perfume, and some prize crocodile eggs as food. The tough skin is made into a high-grade leather, and is used especially in the manufacture of traveling bags.

A peculiar bird of the plover family is known to alight on crocodiles and alligators, and when the animals' mouths are open, will pick their teeth in search of food, chiefly parasites.

When danger threatens, the birds emit a cry and fly away, and this is also a warning of danger to the crocodile. This bird is generally known as the crocodile bird.

Under favorable conditions, crocodiles are very long-lived animals; many are known to have lived for nearly three hundred years, though this is above the average.

The fanciful tale which ancient travelers told about crocodiles weeping over their victims gave rise to the term *crocodile tears*, meaning hypocritical tears. See ALLIGATOR; GALVIAL.

L.H.

Scientific Names. Crocodiles belong to the family *Crocodylidae*. The crocodile of the Nile is *Crocodylus vulgaris*; the crocodile of Florida is *C. americanus*.

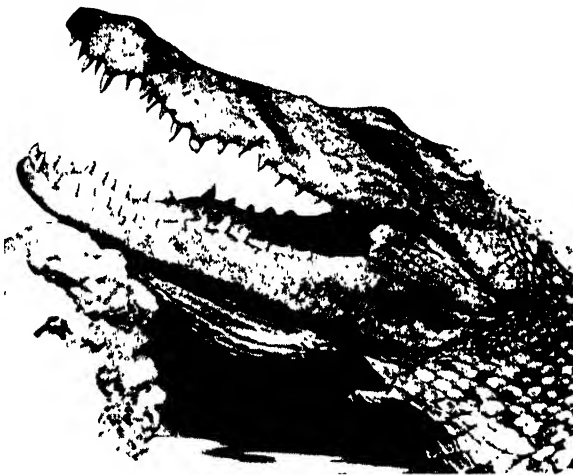
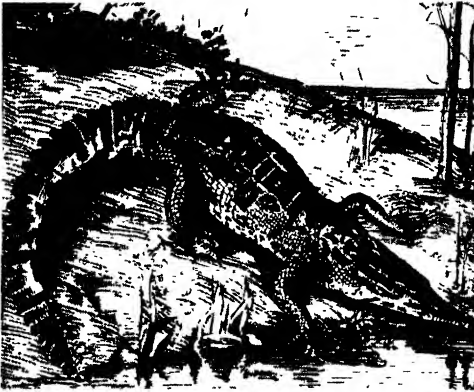


Photo U & U

HEAD OF A NILE CROCODILE



AMERICAN CROCODILE

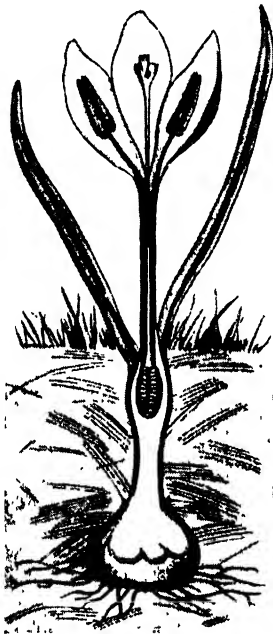


GANGES CROCODILE

CROCODILE BIRD. See CROCODILE. The same bird is also called the *alligator bird*.

CROCUS, *kro' kus*, one of the first flowers to push through the snow in gardens to announce the approach of spring. It was the early spring flower of the Greeks; Homer says, "The flaming crocus made the mountains glow." Most species are natives of Southern Europe and Asia Minor, but are now cultivated in gardens everywhere. Up from the corm shoot the grasslike leaves (see CORM); and at the same time the almost stemless funnel-shaped flowers gladden the eye with their purples, lilacs, mauves, yellows, and whites. Some are fragrant, and all have six nearly equal parts, with three stamens. Planted on a lawn, with their soft background of green, crocuses are especially attractive. They are easily cultivated, will grow from year to year, and are inexpensive. The yellow crocus, or *cloth of gold*, is a favorite species.

Crocus is Latin for *saffron*. From the stamens of the autumn-flowering species of crocus is obtained the saffron used as a stimulant in



CROSS SECTION OF CROCUS
Fair-handed Spring unbosoms every grace,
Throws out the snowdrop and the crocus first
—THOMSON. *Seasons*.

medicine, in cakes and candies for coloring, and as a dye. Most of the saffron of commerce comes from Persia, the autumn-flowering crocus being rarely cultivated elsewhere; aniline colors, however, are now taking its place.

In mythology, a boy who was in love with the nymph Smilax was changed into a crocus blossom. B.M.D.

Scientific Name. The crocuses belong to the family *Iridaceae*. The yellow crocus is *Crocus aureus*, the autumn species is *C. sativus*.

CROESUS, *kre'sus*, one of the mightiest and richest of kings, the last to reign over Lydia, from 560 to 546 B.C. "Rich as Croesus" is a familiar term used to denote fabulous wealth. Croesus obtained his riches from mining gold and from levies upon the people. Noted for his reverence for the oracle of Delphi, he gave enormous presents to it. Finally, he declared war on Persia, the oracle having assured him that if he crossed the Halys River he would destroy a great empire. This prophecy proved true, but the destroyed empire proved to be his own, for he was utterly defeated, and Sardis, his capital, was taken.

CROFTING. See BLEACHING.

CROIX DE GUERRE, *krawh de gare'*, French words meaning *cross of war*, a decoration instituted by France during the World War to be bestowed on soldiers who were cited in reports



Photo U & U
CROIX DE GUERRE

for signal acts of bravery, in any of the allied armies. It is in the form shown on page 1751; the medal is of bronze, the ribbon is green, with a red edge on each border, and five parallel red bands cross it. The cross without palms was awarded for the first conspicuous act which was deemed to merit the distinction; for additional citations, bronze palms were attached to the ribbon; in the case of five citations, the four palms already attached were removed and a silver palm was substituted.

CROKER, RICHARD. See TAMMANY HALL.

CRO-MAGNON, kro' ma nyawn'. See STONE AGE.

CROMWELL, OLIVER (1599-1658), an "uncrowned king" of England, whose official title upon his rise to power was LORD PROTECTOR OF THE COMMONWEALTH OF ENGLAND, SCOTLAND, AND IRELAND. Few men have ever inspired more heartfelt love and reverence, and at the same time more heartfelt fear and hatred, than did he, and historians have not ceased to dispute about his character. Certain things about him, however, cannot be questioned—that he was a man of iron will, and that in everything he did he was true to a high moral purpose. He never went into battle without a prayer on his lips, and he so bore himself that one who knew him intimately said, "A larger soul, I think, hath seldom dwelt in a house of clay."

Cromwell was born April 25, 1599, at Huntingdon, of a family which had been high in favor with the English kings, but little is known of his early life beyond the fact that he studied at Sidney Sussex College, Cambridge, and in 1620 married Elizabeth Brouchier, a

woman of some wealth. After that date his movements are better known. Elected to Parliament in 1628, he showed no signs of

his future greatness, but he delivered one speech which made it clear that, when the inevitable religious conflict came, he would be on the side of the Puritans. Indeed, his love for religious toleration was so intense that at one time he thought seriously of emigrating to America to join its Puritan colony. In 1640 came the beginning of his rise to prominence, for in that year he was elected to what became

known as the Short Parliament, and to the Long Parliament, which almost immediately succeeded it.

Cromwell did not at once take a leading part in that body. He spoke on all important topics, but he was content to remain subordinate. But when the Civil War broke out in 1642, he became the dominant Parliamentary force, for this man who "never saw an army till he was forty" was a born military genius. He trained his cavalry till he had at his command the best-drilled regiments in England, and in all the battles in which he was at the head of the Parliamentary army, the royalists were defeated, for he never lost a battle. When, in 1645, the Self-Denying Ordinance was passed, excluding members of Parliament from military command, an exception was made in favor of Cromwell, who continued to lead his "Ironsides." Under him served men whom he had picked for their religious enthusiasm no less than for their military forcefulness.

When the break came between the two factions of the Puritans, the Presbyterians and the Independents, Cromwell identified himself with the latter and strengthened his hold on the army, while the Presbyterians ruled in Parliament. Fearing that the latter sect would actually restore to power the tyrannical Charles I, to whom they had begun to make advances, Cromwell finally agreed to the execution of the king, and was one of the signers of the death warrant. In Ireland and in Scotland, strong royalist parties yet remained, but Cromwell, by his stern methods and his vic-

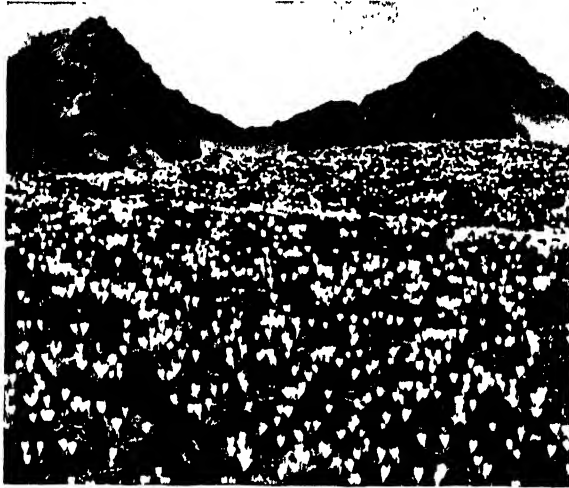


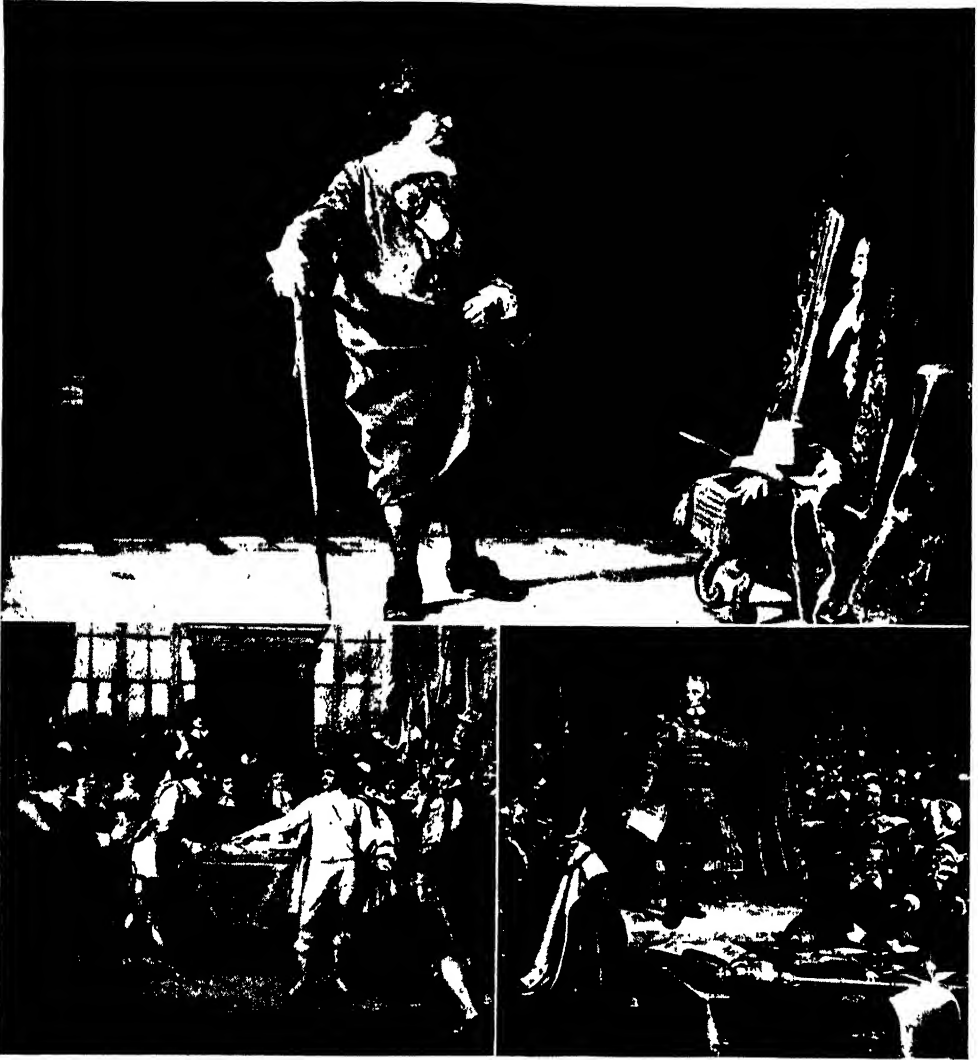
Photo: U & U

THE DAWN OF SPRING

The dainty crocus ushers in the beautiful season in the Upper Engadine, Switzerland.



OLIVER CROMWELL



INCIDENTS IN THE LIFE OF CROMWELL

The Lord Protector agreed to the execution of Charles I, before whose portrait he is standing, deep in thought. Cromwell dissolves the Long Parliament. In the third illustration, he is portrayed in the act of refusing the crown of England.

torious battles, succeeded by 1650 in putting down the last active movements in behalf of the royal house.

The Long Parliament, having been in session for twelve years, refused to disband, nor would it submit itself to Cromwell, so he disbanded it in 1652 with the aid of his troops, and summoned a new one. This body was unable to accomplish anything, and when it dissolved of its own accord, the officers of the army took matters into their hands, drew up the so-called Instrument of Government, and made Cromwell Lord Protector. A Parliament was assembled, but proved to have no object beyond

making itself perpetual, and the Lord Protector therefore dissolved it, relying on the army for support in his wise and tolerant schemes. The only other Parliament which he ever called (1656) offered him the title of king, and it seems that he refused it only because he dared not accept.

The greatest thing that Cromwell accomplished for England was the restoration of its world influence by means of a wise foreign policy. In the years just before the establishment of the Commonwealth, it had almost ceased to be looked upon as one of the great powers, but at his death it stood fully as high

as it ever had. It might be expected that so determined an opponent of absolutism would have banished all trace of it from his own rule, and have left on the constitutional history of his country a lasting mark, but such was not the case. In reality, he governed almost as absolutely as did Charles I, but one difference must not be forgotten: Cromwell had no wish to be tyrannical, but was obliged by the very troubled character of the times to adopt stern measures. Charles I was absolute with his own good in view; Cromwell was absolute only in the interests of his country.

He died in 1658, and for two years his son Richard endeavored to continue his father's policy, but he was lacking in strength, and the people welcomed the return of the royal line in the person of Charles II, in 1660. E.D.F.

Related Subjects. The following articles in these volumes provide further information on the life and times of Cromwell

Cavaliers	Naseby, Battle of
Charles (I, II, England)	Puritans
Commonwealth of England	Restoration, The
England (History)	Roundheads
Long Parliament	Rump Parliament
Marston Moor	Self-Denying Ordinance

CROMWELL, RICHARD. See above.

CROMWELL, THOMAS, Earl of Essex (about 1490-1540), an English statesman who rose to power and influence through his willingness to carry out the wholly selfish plans of Henry VIII. Early in his career, he gained the friendship of Cardinal Wolsey (see **WOLSEY, THOMAS**), who encouraged him to enter Parliament; there he successfully defended his patron against a bill of impeachment. Henry VIII, observing his unusual ability, made him his private secretary, and later conferred on him a succession of offices, appointing him Chancellor of the Exchequer, Lord of the Privy Seal, and Lord Chamberlain; finally, in 1540, he was created Earl of Essex.

His submission to the king gave him undisputed authority in all the departments of administration, and he carried out Henry's orders for suppressing the monasteries so vigorously that he was nicknamed the "Hammer of the Monks." Cromwell at last fell a victim to the whims of his royal master, for Henry, conceiving a dislike for his third wife, Anne of Cleves, took revenge on the Earl, who had promoted the marriage, and allowed him to be charged with treason. Thus, in the same year that he received his title of nobility and had reached the summit of his honors, he was beheaded.

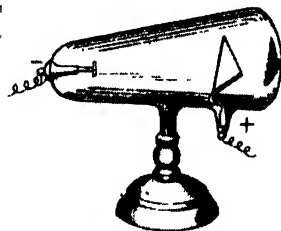
Literary Reference. It was Cromwell, after his last agonizing appeal for mercy, who thus summed up the inconstancy of princes (as recorded by Shakespeare in *Henry Eighth*—Act III, Scene 2):

Had I but served my God with half the zeal
I served my king, he would not in mine age
Have left me naked to mine enemies

Related Subjects. See **HENRY (VIII, England)** and references there found to other articles in these volumes

CRONJE, PIET, *krohn' ye, poet*. See **SOUTH AFRICAN WAR**.

CROOKES, krooks, TUBES, electric vacuum tubes in which Sir William Crookes (see below) performed experiments that led eventually to the discovery of the electron. The device is a glass tube from which the air has been pumped and into the opposite ends of which metal wires, serving as electrodes, have been sealed. When the electrodes are connected with an electric source of high voltage, some very interesting effects



A CROOKES TUBE

take place as a result of the discharge of electricity across the high vacuum. A greenish fluorescence appears on the walls of the tube, and a piece of metal placed in front of the negative electrode, or cathode, throws a shadow on the fluorescence at the other end. Crookes correctly attributed these effects to electrified particles emitted at nearly right angles to the cathode, calling them "a fourth state of matter." These cathode rays, as they are commonly known, were later proved to be streams of electrons projected from the negative electrode. (The electron is the ultimate unit of negative electricity.) Crookes tubes have become important commercially because they are used in the construction of X-ray machines.

Smaller partial-vacuum tubes, containing different gases and used as electric toys, are known as *Geissler's tubes*.

Sir William Crookes (1832-1919) was born in London. After completing his education at the Royal College of Chemistry, he became superintendent of the department of meteorology at Radcliffe Observatory, Oxford University. In 1855 he accepted the professorship of chemistry at Chester Training College. In 1859 he founded the *Chemical News*, and assumed its editorship.

Professor Crookes' experiments in electricity were not the only investigations to bring him fame. He was also the discoverer of the element thallium, and of the sodium amalgamation process of separating gold and silver from their ores. He was regarded as the highest authority on the application of the laws



Photo Brown Bros

SIR WILLIAM CROOKES

of chemistry to the industrial arts, and on matters of sanitation. He was knighted in 1897, was awarded the Nobel prize for chemistry in 1907, served as foreign secretary of the Royal Society from 1908 to 1912, and in 1914 was elected president of that organization.

The writings of Professor Crookes, which are numerous, include *A Practical Handbook of Dyeing and Calico Printing*, *Select Methods of Chemical Analysis*, and *Diamonds*. H S.F.

Related Subjects. The reader is referred in these volumes to the following articles

Amalgam	Electrode
Cathode Rays	Geissler's Tubes
Chemistry	Roentgen Rays
Electricity (What Is Electricity)	Thallium

CROP. See GIZZARD

CROP ROTATION. See ROTATION OF CROPS.

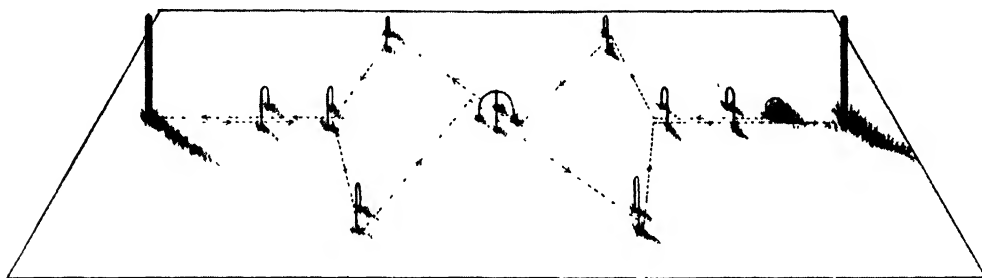


DIAGRAM OF A CROQUET FIELD

CROQUET, *kro ka'*, a game requiring, like billiards, firmness of wrist and a true eye, played by young and old, indoors and out. Indoors, a long table, with a raised edge and covered with a smooth cloth, is used. The outdoor game, however, is the more popular. A well rolled turf or a smooth spot of clay forty-five by ninety feet is best, but the game can be played enjoyably on any reasonably level lawn.

A croquet set consists of eight balls, each with a painted colored band to match a similarly marked mallet, two stakes, one banded to match the colors on balls and mallets, the other with one band, and ten wire arches, or *wickets*. The wickets are placed as shown in the diagram; sometimes only nine are used, in which case only one is placed in the center of the field. Two or more persons play. If two play, each sometimes uses two balls. When four play, each has but one ball, but when playing partners, those who play together have many opportunities to help each other to favorable positions.

The object of the game is to start the ball from one stake, make the circuit through all arches on one side, including a middle arch, hit the other stake, then pass through the arches on the other side, back to the starting stake. The player or side first completing the circuit wins the game. Each player, according to the usual rules, is allowed to strike his ball but once, aiming for a wicket. If the

ball passes through the wicket, he may play again. If his ball strikes an opponent's ball, he may place his ball beside the opponent's and so strike his own that the other is sent out of position, and his own to a more favorable spot. He has the alternative privilege of placing his ball a mallet-head length from his opponent's and taking two strokes.

There are special rules for emergencies, and a number of technical terms. A player who hits an opponent's ball may not do so again until he has sent his ball through an arch. Until he succeeds in so doing, he is said to be *dead* on that particular ball. A *rover* is a ball which has completed the circuit, but has not touched the home stake. Such a ball may play on every other ball in the field,

and its owner may assist his partner, and hit his opponents' balls as often as he chooses without his ball being considered *dead*, except that he cannot hit the same ball twice in one turn.

The game of croquet is thought to have originated from the old French game *pail mail*, which gave its name to that famous street in London, Pall Mall.

Roque, roke. A scientific form of croquet, rapidly gaining popularity in America and England. The game differs from croquet in that the field is usually a cement, cinder, or clay court, and banked on all sides by a border, which is sometimes rubber padded to give the balls rebound. The roque mallet is made with a very short handle, which compels the player to hold it in one hand close to the ground. The balls are larger than croquet balls and sometimes are made of hard rubber, and the wickets are narrower than the croquet wickets. The course of play is similar to that of croquet; however, there are special rules which apply to roque only. Chief of these is the "jump shot," which permits banking the ball.

CRORE, krohr, the sum of 10,000,000 rupees. See RUPEE.

CROSBY, FANNY (1820-1915), the childhood name of FRANCES JANE VAN ALSTYNE, a blind hymn-writer whose songs have solaced millions of people. She was born at Southeast, N. Y., and when only six weeks old she lost her sight through the application of too hot a poultice to her eyes. At the age of fifteen, she

entered the New York Institution for the Blind, where she spent twelve years as a pupil. Her teachers noticed her wonderful gift for writing poetry, and frequently selected her to address distinguished guests. These addresses were always in verse.

In 1847 she became a teacher in the same institution in which she had received her education. After eleven years in that position, she married Alexander Van Alstyne, a blind musician, who was then a pupil in the school. In 1864 she began writing hymns, and no other person since the days of Charles Wesley and Isaac Watts has made so large a contribution to the gospel songbook, for at her death over 6,000 hymns bore her signature. Her favorite song, *Safe in the Arms of Jesus*, was written when she was suddenly inspired with the sense of security in trusting in God; *Rescue the Perishing* was inspired by another event. Such songs from her pen as the following are known the world over: *Pass Me Not, Blessed Assurance*, and *What a Gathering*. The chorus of *Close to Thee* typifies the faith of her whole life:

Close to Thee, close to Thee;
All along my pilgrim journey,
Saviour, let me walk with Thee.

CROSS, a structure consisting of an upright and a crosspiece attached to it, which, since the crucifixion of Christ, has been a sacred symbol throughout the Christian world. Literature, especially hymnology, contains innumerable references to the cross as a religious emblem. Spenser alludes to its use as a symbol in Christian warfare, in the following passage from the *Faerie Queene*:

And on his breast a bloody cross he bore
The dear remembrance of his dying Lord,
For whose sweet sake that glorious badge he wore.

The cross as a symbol of Christianity, as distinguished from the moon, or crescent, the emblem of Mohammedanism, is beautifully expressed in Shelley's lines:

The moon of Mahomet
Arose and it shall set;
While, blazoned as on heaven's
immortal noon
The cross leads generations on.

In ancient times slaves and criminals of the lowest class were frequently tied or nailed to crosses and left to perish of pain or starvation. Such a cross was often formed merely by fasten-

ing a piece of wood to a tree or a post. Though the death of Christ gave the cross a new meaning, it was an object of religious veneration among savage tribes long before the Christian Era.

The part the cross plays in the development of the Christian religion is interesting, indeed, and it is believed dates back to the second century, at least. Some years ago a document was discovered which gives the earliest record of the solemn veneration of the cross, in a description of a pilgrimage to Jerusalem, probably in the year 384 or 385. In the Middle Ages, a cross was prefixed to most documents as a sort of consecration. The practice of erecting monumental crosses to mark the graves of heroes, kings, and bishops was one of early development; they were erected also in the market places, as stands from which to preach. From this custom, it may be said, the cross assumed its later-day imposing character.

Various forms of the cross are used in art. The Latin cross, supposed to be the one on which Christ died, consists of a long upright beam and a piece fastened to it at right angles below the summit. The Greek cross has four arms of nearly equal length, this being the form of the Cross of Saint George, the national ensign of the English before the union with Scotland.



Greek



Maltese



St Andrew's



Latin



St Anthony's



Calvary



Patriarchal

VARIOUS FORMS OF CROSSES

The Cross of Saint Andrew, consisting of two beams crossing one another obliquely, is traditionally the form of cross on which Saint Andrew died a martyr. It is now blended with the Cross of Saint George in the British ensign, the Union Jack. A form used by the orders of knights in the days of chivalry was the Maltese cross, having eight pointed ends.

[The development of the Union Jack, in which the cross is prominent, is shown in the color plate of British flags, in the article GREAT BRITAIN.]

CROSS, MARY ANN, or MARIAN. See ELIOT, GEORGE.

CROSSBILL, a gentle, friendly bird of the finch family, whose peculiarly crossed bill gave



Photo: Brown Bros.

FANNY CROSBY

it its name and has called forth various legends. The fanciful tale that the bird tried to draw the nails from the hands of Christ on the cross, so crossing its bill and staining its feathers with blood, has been put into verse by Longfellow in *The Legend of the Crossbill*.

The red, or American, male crossbill is colored brick- or Indian-red, with wings and tail of brown, and is about the size of an English



THE CROSSBILL

sparrow. The plumage of the female is a slightly mottled, dull yellow. This bird breeds from the Northern states northward, but in the Alleghenies it breeds as far south as the Carolinas. In winter, crossbills wander in small flocks to the Gulf of Mexico and west as far as Idaho and Arizona, sometimes staying from November until April. They build their nests in the upper half of an evergreen, and there are three or four tiny, pale-greenish, purple or lilac-spotted eggs. Crossbills feed chiefly on seeds of conifers, supplementing this fare with small quantities of buds and a few insects. The crossed bill is used very handily in stripping the scales from the cones. These birds are not important economically.

The white-winged species of crossbill is similar in habits to the red crossbill. It breeds from the Northern states northward and wanders in winter as far south as Virginia. D.L.

Scientific Names. The crossbills belong to the family *Fringillidae*. The red crossbill is *Loxia curvirostra minor*. The white-winged is *L. leucoptera*.

CROSS-EYES. See SQUINTING.

CROSS-POLLINATION is the work of water, wind, insects, and birds, and the process is intermediary and often necessary to the production of fertile seeds by plants. Those agencies bring the pollen from the stamens of one plant to the pistils of another, thus bringing together the characteristics and habits of two distinct individuals in the seeds. In this

way a mixed or variable population within the species is maintained, and in addition, a sustained vigor of production usually is made possible. In *self-pollination*, leading to self-fertilization, the pollen of a plant falls upon its own pistil and produces seeds holding just the same faults or virtues as the parent plant possesses.

In the natural order of species origination in nature, structures have persisted that were useful in facilitating cross-pollination and in insuring cross-fertilization. For instance, in some plants, like the geranium, the pistils of one flower are not ready to receive pollen when its own pollen is ripe. Others, like the primrose, have shorter stamens than pistils, so its own pollen cannot reach its stigma. And in some cases, like the willow, one plant bears the staminate blossoms, another the pistillate. So the winds, the insects, and the birds are nature's pollen carriers.

Once again the beautiful relationship of plant to environment may be noted. Those plants which depend on the wind produce large quantities of light, dry pollen, for much of it will be wasted. But much less pollen is produced by the flowers with stores of honey and with scents and colors which attract insects and birds, for these things give assurance that the pollen will be distributed, and the pistils will be dusted with pollen in a relatively economical manner.

The orchid carries its pollen in little sticky bundles, and the flower is so constructed that in order to reach the store of nectar, the bird or insect must reach so far in that a bundle of pollen will glue itself to its head. When the next flower is reached the pollen will be brushed on the receptive pistil as the insect pushes in for its honey. The pollen of the milkweed is found in two little bags connected by a strap-like part; the feet of the bee get tangled, and so it carries away both bags of pollen. The mints are provided with levers which thrust the pistil forward on the pollen-dusted insect.

In a general sense, the term *crossing*, related to cross-pollination, is also applied in cases of animals and the human race. A limited amount of crossing in similar environments, and under similar conditions among species not too closely related, may produce improved offspring. This principle underlies the work of livestock breeders and of plant breeders. B.M.D.

Related Subjects. The reader is referred in these volumes to the following articles:

Breeding
Burbank, Luther

Flowers
Pollen and Pollination

CROSS VINE, a species of bignonia (which see).

CROTON AQUEDUCT. See AQUEDUCT.

CROTON BUG. See COCKROACH.

CROUP, *kroop*, a word commonly understood to mean a disease of babyhood or childhood, characterized by hoarse cough and periods of

difficulty in getting the breath. There are two forms of the disease—*spasmodic*, or *false*, croup, and *membranous* croup. The latter is laryngeal diphtheria, and can usually be distinguished by the severity of the symptoms, expulsion of pieces of membrane, and patches on the throat. It is a highly infectious disease, requiring the use of antitoxin (see DIPHTHERIA). False croup often attacks feeble or ill-fed children who have suffered exposure to cold and wet or are subject to digestive disturbances. The attacks come on suddenly, and the child awakens coughing hoarsely and breathing heavily, or gasping. The face becomes red or purplish, and the patient seems on the verge of suffocation. Paroxysms may last from half an hour to five or six hours, and may occur on several nights in succession. A teakettle of hot water placed under a sheet thrown over the child's bed permits inhalation of warm, moist air, a remedy generally advised by physicians.

The child should also be given frequent drinks of warm milk, and vomiting should be induced by doses of syrup of ipecac, a half-teaspoonful being given every fifteen minutes, as long as is necessary.

Children who are subject to spasmodic croup should keep in the sunlight and open air as much as possible. They need lime, and should have it in the form of milk, vegetables, and nuts, and sometimes as medicine. The name *membranous croup* should be abandoned in favor of diphtheria. W.A.E.

CROUPIER, *kroo' pe ur* See ROULETTE.

CROW, the common name of a family of large, black birds found in nearly all parts of the world. The characteristic hue of these birds has given rise to the old familiar expression, "as black as a crow." Included in the family are the common crows, jays, ravens, magpies, fish crows, whisky jacks or Canada jays, and the rooks and jackdaws of Europe. History and literature, including sacred writings, contain frequent and striking references to its various members.

The clever, fearless *American crow*, also called *corn thief*, is typical of the crow tribe, and is commonly seen in meadows, orchards, and woods throughout the United States and most of Canada. It usually winters in the United States. It is eighteen or nineteen inches

long and has glossy black plumage, with violet and greenish reflections. Its bill is strong, compressed toward the points, and covered with bristly feathers at the base. When spread, the wings appear saw-toothed and are almost as long as the tail. The feet are stout and especially adapted for walking. The sexes are about alike in appearance. These birds are intelligent to a remarkable degree, and they are easily

domesticated. Occasionally, one becomes a family pet, but it will steal and fly away with any bright object, and so is sure to be more or less of a pest.

The crow has earned an unfavorable name among farmers because of its pernicious habit of pulling up sprouting corn in its search for cutworms, white grubs, and other forms of insect life, and because of its liking for poultry and eggs. It also eats the growing corn. In a *Farmers' Bulletin*, issued by the United States Department of Agriculture, the suggestion is made that

the seed grain be coated with coal tar to prevent damage to the growing corn. The crow so dislikes the odor of this substance that it will usually pass by the corn hills in which seed so treated has been planted. It is also pointed out that losses of poultry and eggs may be prevented by proper housing and the use of wire netting. One of the chief crimes with which the crow is charged is its destruction of beneficial wild birds and their eggs. Accordingly, communities in which it has become a nuisance are justified in reducing its numbers. On the other hand, the crow renders excellent service to the farmer by feeding on insect pests; careful estimates show that in one season the crows will eat nineteen bushels of insects on an average farm. The control, rather than wholesale destruction, of these birds is advocated by the United States Biological Survey.

Crows are devoted to their mates. The coarse nests are built along hedges or high in tree tops. The four to six or seven eggs are pale bluish-green or nearly white, spotted with brown.

The *fish crow*, a greater enemy of birds than the common crow, is abundant on the Atlantic coast, from the Gulf of Mexico to Southern New England and New York. It does not touch the crops, however; shellfish and other



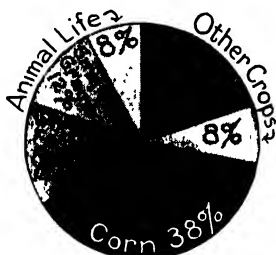
Even the blackest of them all, the crow,
Renders good service as your man-at-arms,
Crushing the beetle in his coat of mail,
And crying havoc on the slug and snail
—LONGFELLOW. *Tales of a Wayside Inn*

sea food constitute much of its diet. It is more slender than the common crow, and another important difference between the two is its more feminine call—*car-r car-r*—like that of the young of the more common species.

Crows usually fly in a straight course, and the expression, "as the crow flies," used in judging distances, means in a straight line from one point to another. Crows are said to live to be about a hundred years old. D.L.

Scientific Names. Crows belong to the family *Corvidae*. The American crow is *Corvus americanus*; the fish crow, *C. ossifragus*.

CROW BLACKBIRD, OR PURPLE GRACKLE, *grak'ul*, a handsome blackbird over a foot in length, common in the Middle Atlantic states. It may be recognized by the violet blue,



FOOD OF THE CROW

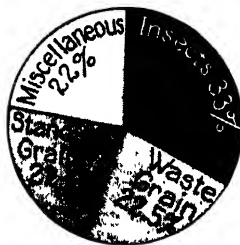
time. They build bulky nests of mud and grasses in trees, preferably in evergreens, and lay three to six or more greenish or brownish eggs with dark blotches. On the ground, grackles have a peculiar strutting walk; on the wing, they fold their tail feathers upward and use the tail for steering. The good these birds do in devouring injurious insects is somewhat offset by their habit of eating grain. They also have been known to raid the nests of smaller birds. See GRACKLE. D.L.

Scientific Names. Grackles belong to the family *Icteridae*. The purple grackle is *Quiscalus quiscula*; the bronzed, *Q. quiscula aeneus*.

CROWFOOT. See BUTTERCUP

CROW INDIANS. See INDIANS, AMERICAN (Most Important Tribes).

CROWN, a heavily jeweled ornament worn on the head of a monarch as an emblem of sovereignty, but commonly exhibited only on state occasions. The custom of wearing this brilliant insignia of royal dignity was borrowed probably from the Romans, who decorated their popular heroes with wreaths and garlands, which gradually were made of metal, usually



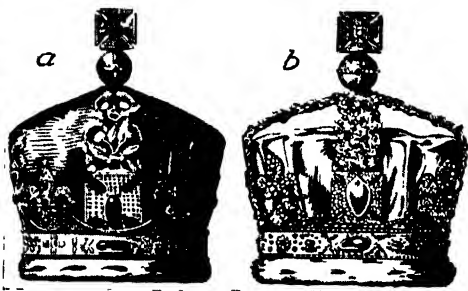
FOOD OF THE CROW BLACKBIRD



Photo: Visual Education Service

THE CROW BLACKBIRD

copper, and green tints of its plumage, its long, wedge-shaped tail, and the bright-yellow iris of its eye. The *bronzed grackle*, of Central and Southeastern Canada and the Middle Western states, and the *Florida grackle*, of the South Atlantic and Gulf states, are subspecies. The former is found as far north as Labrador, and spends its winters in the lower Mississippi Valley. It is a lustrous black, all over, though the male shows tints of purple to blue-green about the neck. The grackles are found in flocks throughout the year, though in smaller colonies at nesting



ENGLISH CROWNS

(a) Worn by Queen Victoria; (b) the crown of King George V

gold. The modern crown is in fact an evolution of the jeweled head-dress of the Assyrian and Egyptian monarchs and the diadem of the Roman emperors. From the reign of Constantine (306-337), the diadem was regarded as the emblem of imperial power. It gradually received additional ornaments, until the modern elaborate crown was evolved. The British royal crown is a gold circlet, ornamented with diamonds, pearls, and other precious stones, heightened by crosses and fleur de lis, from which rise four arches surmounted by a jeweled

gold cross. Some of the jewels in the crown of King George of England are of great historic interest and are regarded as almost priceless. The intrinsic value of crown and jewels has been estimated at about \$1,000,000. A few of the crowns of Indian princes contain jewels whose value seems almost fabulous to Western peoples.



CROWN OF CHARLEMAGNE
Preserved in the old Imperial Treasury in Vienna.
See illustration, in article
CHARLEMAGNE

[In the article *RUSIA* appears an illustration of the crown jewels of the late Russian royal house. One of the most conspicuous of these objects is the crown of the czarina.]

Iron Crown of Lombardy, a name given to the crown worn by the Lombard kings and the emperors of Germany when they became kings of Lombardy. It is made of gold, but takes its name from an iron circlet which tradition says was beaten from a nail of the Cross on which Christ was crucified. When it was made is not known, but previous to the twelfth century it was called the Golden Crown. The most notable monarchs who wore this crown were Charlemagne, Charles V, and Napoleon I. It is now preserved in the Church of Saint John the Baptist at Monza, Italy.

CROWN, an English silver coin of the value of five shillings, or one-fourth of a pound sterling. This is equivalent to about \$1.22 in United States or Canadian money. It bears a likeness of the reigning sovereign on one side and a crown on the other. The name was probably first given to this particular coin in the reign of Charles I, a special issue then being known as the Oxford Crown. In the time of Henry VIII, a coin of similar value was issued in gold, but this coinage was replaced by silver in the reign of Edward VI. The crown, as now in circulation, weighs 436.3636 troy grains, of which .925 is pure silver. It is heavy and cumbersome and is often mistaken for a double florin, or four-shilling piece, which it closely resembles. The crown is also the monetary unit of Austria, Hungary, Denmark, Norway, and Sweden. See *MONEY* (Foreign Monetary Standards).

CROWN COLONIES. See *BRITISH EMPIRE*.

CROWN LANDS. See *LANDS, PUBLIC*.

CROWN POINT, a township in Essex County, N. Y., important for its Revolutionary War associations. It was settled by the French in 1731, and was one of the chief frontier posts during the struggle for colonial possessions. Along the natural lines of travel and communication between Canada and the colonies of England, Crown Point, a little fortress on Lake Champlain, was a strategic point, for here the

lake narrows to the width of a river, therefore a few small cannon could command the passage. This was called *Scalp Point* by the French, *Crown Point* by the English. At the outbreak of the Revolutionary War, while Arnold and Ethan Allen took Ticonderoga, a body of "Green Mountain Boys" under command of Seth Warner captured Crown Point, on May 11, 1775, with 200 cannon and a quantity of ammunition. A slope of the embankment with part of the ruins of the barracks is still standing.

[Crown Point village is 110 miles north of Albany and ten miles from Ticonderoga, on the west shore of Lake Champlain and on the Delaware & Hudson Railroad. Since the mining of iron ore has been abandoned, the town is dependent on its agricultural resources. Population, about 2,200.]

CROYDON, *kroi' don*, ENGLAND. See *ENGLAND* (The Cities).

CROZET RISE. See *OCEAN* (Bed).

CRUCIFERAE, *kroo sif' ur e*. See *MUSTARD*, subhead.

CRUELTY TO ANIMALS, SOCIETY FOR THE PREVENTION OF, the name for various humane organizations which have been influential in securing laws providing punishment for mistreatment of animals. Support is provided by popular subscription. The first society for this purpose was organized in 1824 in England. Scotland followed in 1830, and in 1866, through the influence of Henry Bergh, the first society of that kind in America was organized (in New York). Other countries took up the movement, and now there are similar societies in nearly every country. These societies are endeavoring to secure proper treatment of animals through education of the people rather than by force.

In some places, laws passed through the influence of these societies regulate the treatment of wild animals in captivity, as well as of domestic animals. In nearly all countries, legislation fixes a fine from \$5 to \$100 or imprisonment from thirty to sixty days, or both, as a punishment for cruelty to any domestic animal. Other laws require railways to unload, every twenty-four hours, for rest, feed, and water, all livestock which is being shipped long distances. In some cities, ambulances and derricks have been provided for the removal of disabled and fallen animals. See *BERGH, HENRY*.

CRUIKSHANK, *krook' shangk*, GEORGE (1792-1878), an English artist, born in London, who became famous for his caricatures. His father and elder brother were both caricaturists, and at fifteen years of age he was fairly on the road to fame. He was a moralist as well as an artist, and as a total abstainer, he finally consecrated his art to portraying the downward career of the drunkard. In 1837 he commenced his famous series of steel etchings to illustrate Dickens' *Oliver Twist*, and these were full of pathos, humor, and tragic power. For over



Photo: O R O C

EFFIGY OF A CRUSADER

If a Crusader was fortunate enough to have reached the Holy Land, this fact was taken note of in recumbent statues of him by crossing his legs. The effigy in the foreground is that of the Earl of Essex; it is now in the Temple Church, London.

half a century, he caricatured the costumes, manners, and vices of the English people.

CRUSADES, *kru saydz'*. No other great event of history has stirred the imagination of the world more than the long and bitter struggle for the possession of the Holy Land, which we call the Crusades. They were the Holy Wars of the Middle Ages, carried on from the eleventh to the thirteenth century by the Christian nations of Western Europe, in the effort to wrest from its Mohammedan possessors the land where Christ had lived and died. The Crusaders took their name from the Latin word *crux*, meaning *cross*, for the Cross of Christ was their badge of warfare. Their deeds and traditions are perpetuated in a collection of tales and poems of infinite variety. Sir Walter Scott's *Talisman* is one of the most celebrated stories of the Crusading period.

In the earlier pilgrimages to the first home of Christianity may be found the origin of the Crusades. From the time the Christian faith took root in Western Europe, bands of pilgrims had made their way to the Holy Land to visit the sepulcher of Christ, and in the eleventh century, a period of religious revival, they traveled by the thousands along the highways leading to Jerusalem. Under the tolerant rule of the Saracen caliphs, these pilgrims were kindly treated, but all this was changed when, in 1071, Jerusalem was captured by the Seljuk Turks, a Tartar tribe fanatical in its loyalty to the faith of Mohammed.

Then came stories of brutal treatment and persecution, of exorbitant sums charged at the gates of Jerusalem, and of unbearable insults to the Christian pilgrims. Western Europe was roused to a high pitch of religious fervor and indignation, and it was determined to wrest the Holy Sepulcher from the hand of the "Infidel." Besides this lofty religious ideal, there were

other forces arising from the spirit of the age which helped the movement—love of adventure, commercial ambition, and the desire for military glory. All classes, from king to the lowest man in the realm, had their reasons for joining the forces, which quickly prepared to march. Serfs seeking relief from conditions that had become unbearable and criminals fleeing from justice were present in the ranks of the Crusaders.

The First Crusade (1096-1099) The First Crusade was inspired by the preaching of Peter the Hermit, who on his return from a pilgrimage to the Holy Land, aroused the multitudes everywhere by his vivid descriptions of the sufferings of the pilgrims. At the Council of Clermont, held in 1095, it was definitely decided to organize a Crusade, and Pope Urban II, addressing a great throng of clergymen and laymen, so moved them by his eloquence that they cried out as with one voice, "God wills it." This became the great battle cry of the soldiers during the Holy Wars.

In 1096 the first Crusaders, unorganized and without sufficient supplies, began the march toward Palestine. Nearly all of these perished before Constantinople was reached, and the few who succeeded in crossing the Bosphorus were cut to pieces in Bithynia by the Turks. Later in the year, however, five well-equipped armies set out for Constantinople by different routes. They were led by Godfrey de Bouillon, Raymond of Toulouse, Robert of Normandy (the brother of William II of England), Robert of Flanders, and other heroes.

Traversing Germany, Hungary, and the Byzantine Empire, they passed over into Asia Minor, conquered Nicaea in 1097, gained a hard-won victory over the Turks at Dorylaeum, and in June, 1098, stormed the city of Antioch. Just a year later, they laid siege to Jerusalem, which they captured after a desperate struggle. Godfrey de Bouillon was chosen ruler of the Holy City, and other nobles were left in control of Antioch and Edessa. These three cities were held by the Christians for nearly fifty years, their defense being aided by the Order of Knights Templar and Knights Hospitalers.

The CRUSADES



Peter the Hermit
preaching the Crusades



Church of the Holy Sepulcher.
Jerusalem



At a shrine
along the route



Costumes
of the
period



Landing of
Saint Louis

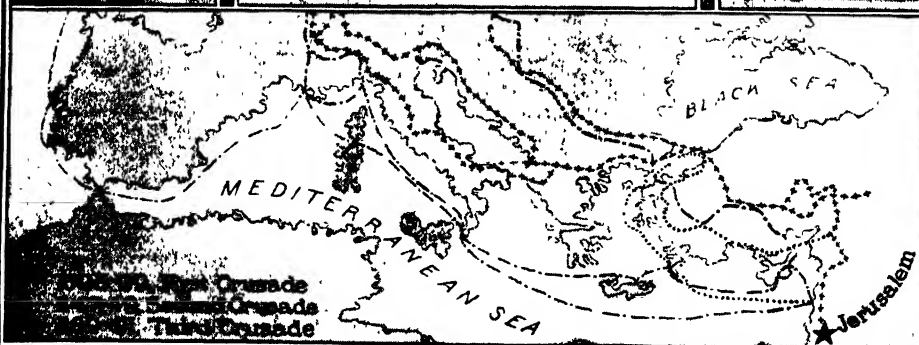




Photo Brown Bros

Richard the Lion-Hearted. The English sovereign is shown in the center of a group of knights on the way to the Holy Land. The costumes show the armor of the period. See RICHARD (I, England).

The Second Crusade (1147-1149) The recapture of Edessa by the Mohammedans in 1144 again aroused the Christians to a holy zeal, and a second Crusade was preached by Saint Bernard of Clairvaux. Early in 1147, two great armies under the German emperor, Conrad III, and the king of France, Louis VII, started for the defense of the Cross. The expedition was a total failure, and only a remnant of the great host reached home again.

The Third Crusade (1189-1191). This was led by Frederick Barbarossa of Germany, Philip Augustus of France, and Richard I (the Lion-hearted) of England, and was undertaken after the capture of Jerusalem by Saladin, in 1187. Though Barbarossa was drowned in 1190, soon after reaching Syria, his soldiers fought with the French and English at the siege of Acre, which was captured after twenty-three months. Rivalries between Richard and the French king caused the latter to withdraw a few weeks later, and Richard, sole leader of the expedition, finally concluded a truce of three years and three months with Saladin, by which pilgrims were promised the right to visit the Holy Sepulcher, unmolested, while the seacoast from Tyre to Jaffa was to remain in the possession of the Crusaders.

The Fourth Crusade, known as the "False Crusade," never reached Palestine. It was undertaken at the suggestion of Pope Innocent III, and among its leaders were Baldwin of Flanders, Boniface of Montferrat, Geoffrey of Villehardouin, and Simon de Montfort. The Crusaders assembled at Venice in the autumn of 1202, but were diverted from their purpose by the Venetians, who prevailed upon them to storm the city of Zara in Dalmatia. The army spent the winter there, and in 1204 captured and sacked Constantinople. In the same year, a Latin empire was established at Constantinople, with Baldwin of Flanders as its first emperor.

The Later Crusades. The first four Holy Wars are the only ones to which all authorities assign the same numbers. The name *Fifth Crusade* (1228-1229) is usually applied to that undertaken by Frederick II, the German emperor, in fulfillment of a vow. Frederick proceeded to the Holy Land and by concluding a treaty with the Mohammedans secured possession of Jerusalem. For making this truce with the infidels, he was severely upbraided by Pope Gregory IX. In 1244 Jerusalem was retaken by the Mohammedans.

The *Sixth* and *Seventh Crusades*, in 1248-1254 and 1270, respectively, were headed by Louis IX of France. He led an army into Egypt, but was soon defeated and captured, and secured his release only after paying a heavy ransom. In 1270 he started on the second expedition, but died at Tunis, on the way to Palestine. In this Crusade he was associated with Edward Plantagenet (later Edward I of England), who landed an army at Acre in 1271, but accomplished nothing. In 1272 Edward returned home, and this year is usually regarded as the end of the Crusading period.

The Children's Crusade. Of several lesser Crusades, the most remarkable is the one undertaken in 1212 by a great army of boys and girls. About 30,000 children, most of them less than twelve years of age, placed themselves under the leadership of Stephen, a French shepherd lad who declared that God had called him to the rescue of the Holy Land. When the children reached Marseilles, they expected the waters of the sea to divide and give them passage to Palestine. Bitterly disappointed, many of them made

their way homeward, but several thousand were lured on board seven ships by merchants who promised to take them to Palestine free of charge. Two of the



Photo OROG

REMAINS OF A CRUSADERS' CASTLE

It commands the pass from the Mediterranean Sea to Coele Syria, which in the Bible is called "the going up to Hamath." The Hospitalers, one of the great crusading orders, made it their headquarters in 1180; it was surrendered to the Sultan Beybars in 1271. In Frankish history it is known as Krak des Chevaliers. There is a modern Arab village inside the old walls.

vessels were wrecked off the coast of Sardinia, and the others carried the children to Alexandria, where they were sold into slavery.

About the same time, another crusading band, consisting of 20,000 children, started southward from Germany, under the leadership of a boy named Nicholas. Thousands died of hunger and exposure on the way, and the remainder got no farther than Geneva. Few of these ever reached home again.

Results of the Crusades. Though the Crusaders failed to realize their great ideal, the Holy Wars profoundly influenced European history. By their warfare with the Turks, the Crusaders delayed the fall of Constantinople three centuries, giving the young Christian civilization of the West an opportunity to conserve its strength before Mohammedanism again gained a foothold in Europe. By promoting commercial intercourse between the West and the East, the Crusades added much to the wealth and prosperity of Europe.

The Holy Wars helped to destroy feudalism, for large numbers of the nobles perished in the Crusades or lost their fortunes and their estates, and the power of the kings and common people was correspondingly increased. Europe also developed intellectually by these centuries of contact with the more advanced culture of the East. Finally, the Crusades awakened the spirit of exploration and discovery, and therefore played an important part in the epoch-making voyages of the fifteenth and sixteenth centuries.

B.M.W.

Related Subjects. The following articles in these volumes will give added light on the Crusades and on the period in which they occurred:

Bernard, Saint	Knights Hospitalers
Edward (I, England)	Louis (IX, France)
Feudal System	Peter the Hermit
Frederick I, Barbarossa	Richard (I, England)
Godfrey de Bouillon	Saladin

CRUSTACEA, *krus ta' she ah*. See ZOOLOGY (Divisions of the Animal World)

CRUSTACEANS, *krus ta' she anz*, members of the class of shellfish known scientifically as *Crustacea*. Some of the larger crustaceans are among the favorite sea foods of all nations, the smaller ones being the prey of other marine animals. Crustaceans form an important class of joint-footed animals, the *Arthropoda* (which see). The familiar crawfish, crab, and lobster are three of the best known of the 10,000 species now identified, most of which are sea animals, although a few are found in fresh waters and on land.

Although the structure and also the habits of crustaceans vary, all have a hard body coating of chitin; in some this is almost bone-like, while in others it is tough and leathery. The body consists of a number of segments, either free or fused together. Typically, each segment bears one pair of jointed appendages, such as feelers, jaws, and legs. There are two or more compound or single eyes, usually stalked. The animals reproduce by means of eggs, which are generally hatched in water. Some species, like lobsters, carry eggs and young on the hairs of the abdominal legs. As the animals grow, their shells become tight, and they must undergo a process of molting or shedding of the shell, after which the skin grows a new shell. Crustaceans possess great powers of reproduction of lost parts, such as feet, claws, and feelers. Most of these animals eat decaying animal matter, and so are useful in ridding waters and beaches of carrion S.H.S

Related Subjects. A more detailed knowledge of the structure and importance of the crustaceans may be gained from a study of the following articles

Barnacle	Hermit Crab
Crab	Land Crab
Crawfish	Lobster
Fiddler Crab	Shrimp

Zoology

CRUX, *kruks*, in astronomy. See CONSTELLATION.

CRYOLITE, *kri' o lite*, a compound of aluminum, sodium, and fluorine, used in the manufacture of alum, opaque white glass, and various industrial salts, but especially in the reduction of aluminum by electrolysis. In this process, aluminum ore in the form of bauxite is mixed with cryolite, which is readily melted by electricity and causes the bauxite to dissolve (see ALUMINUM, for further details). The chief cryolite deposits are in West Greenland and in El Paso County, Colo. The mineral is of a pale gray or white color, and is three times as heavy as water. See, also, FLUORINE.

Chemical Formula. The formula for cryolite is Na_3AlF_6 ; that is, in each molecule there are three atoms of sodium (*Na* is the symbol for *sodium*, the Latin for which is *natrium*), one atom of aluminum, and six atoms of fluorine

CRYPT, *kript*, a word applied to a vault under an old church or cathedral in which the bodies of saints and martyrs were placed. The crypt was usually the nucleus of the church which was to be erected over it, and in its position it elevated the altar of the saint to whom the edifice was dedicated. In early ages, the crypt also contained altars for the worship of saints and martyrs whose bones were supposed to be deposited there. One of the most famous and beautiful of existing crypts is found beneath Glasgow Cathedral, made famous by Sir Walter Scott in his novel *Rob Roy*. Saint Peter's, Rome, and the cathedrals of Canterbury and Gloucester also contain crypts of great historical interest and architectural beauty.

Derivation. The word *crypt* is from the Greek *kryptein*, which means to *hide*

CRYPTOGAMS, *krip' loh gamz*, OR **FLOWERLESS PLANTS**. These names are applied, in a general way, to all those plants which do not bear seeds. The term *cryptogam* is from the Greek and means *concealed reproduction*. Earlier botanists did not understand the reproduction of plants without flowers, and in ignorance gave such plants a name that really does not fit them. Actually, later studies proved that the reproduction of seedless plants is more easily discerned than that of flowering plants, which the earlier botanists called *phanerogams* (*open reproduction*). While the names are inappropriate and the classifications not scientifically exact, the terms are retained for convenience. Cryptogams reproduce by spores, and are much simpler in structure than phanerogams. They include such plants as algae and fungi, mosses and ferns (all of which see). See, also, SPORE; BOTANY. B.M.D.

CRYSTAL-GAZING. See DIVINATION.

CRYSTALLINE, *kris' tal in*, **LENS.** See EYE.

CRYSTALLINE ROCKS. Granite and marble, especially when polished, show that they contain a great number of crystals cemented together. Rocks having this structure are called *crystalline*. Granite and similar igneous rocks once existed in a molten state, and crystallized as they cooled. Marble is a limestone which has been altered, but not melted, by heat. See CRYSTALLIZATION; IGNEOUS ROCKS. A.J.

CRYSTALLIZATION, *kris tal i za' shun*. Let us make some rock candy. We will dissolve granulated sugar in hot water until we have a syrup. We will then stretch one or more strings across the vessel in the syrup and set it away to cool. In a few hours, clusters of crystals will be formed about the strings, and these crystals make our rock candy. Let us examine them. How many sides have they? Are all the sides the same size? Do all the crys-

tals have the same number of sides? Get some rock salt and compare it with the crystals of sugar. How do they differ? Dissolve as much alum as you can in hot water. Stretch strings through the solution, and let it cool. How

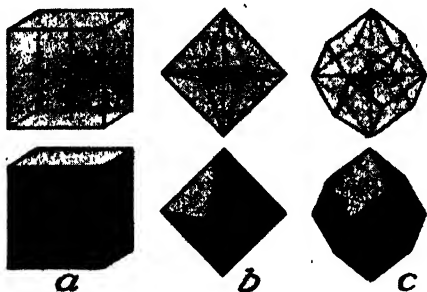


FIG 1

Crystals in the isometric system. (a) A cube of six equal faces; (b) a regular octahedron, with eight equal faces; (c) rhombic dodecahedron, with twelve equal faces

do the crystals of alum differ from those of the sugar and the salt?

By these experiments and the examination of the substances with the magnifying glass, we learn that many solid substances are formed by masses of crystals crowded together. This method of formation is called crystallization.

Systems of Crystals. The geometry of crystals has been worked out in great detail. There are thirty-two crystal classes, and these are grouped into six systems, according to the

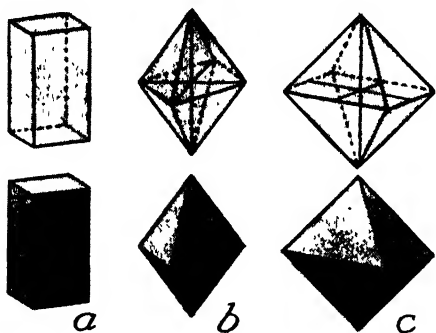


FIG 2

Crystals in the tetragonal system (a) A square prism, with two end faces of different size than the four vertical faces, (b) unit square pyramid, whose faces are isosceles triangles, (c) square pyramid of the second order, diagonal to the square pyramid (b)

arrangement of the axes. These are imaginary lines drawn with reference to the plane surfaces of the crystal.

(1) **Isometric System.** The perfect crystals of this system are cubes (see Fig. 1, a). Common salt, iron pyrite, galena, lead ore,

silver, copper, and gold crystallize in cubes. By cutting the cube as shown in *b*, a double pyramid with eight equal faces is formed. By cutting the edges as shown in *c*, we have a crystal with twelve equal sides. Alum and the garnet are good illustrations. It often happens that the forms described above are found together in the same crystal. There are other more complicated forms of crystals in this system, but all are combinations of the cube.

(2) **Tetragonal System.** The principal forms of this system are two square prisms, two square pyramids, the eight-sided prism, and double eight-sided pyramid. There are no common substances illustrating this system. Fig. 2, *a*, shows the unit square prism, which is the basis of the system. Fig. 2, *b*, shows the unit square pyramid, with all its faces isosceles triangles; Fig. 2, *c*, is a square pyramid diagonal to *b*.

(3) **Hexagonal System.** The different forms of this system are based on the six-sided prism and double six-sided pyramid. Quartz, ice,

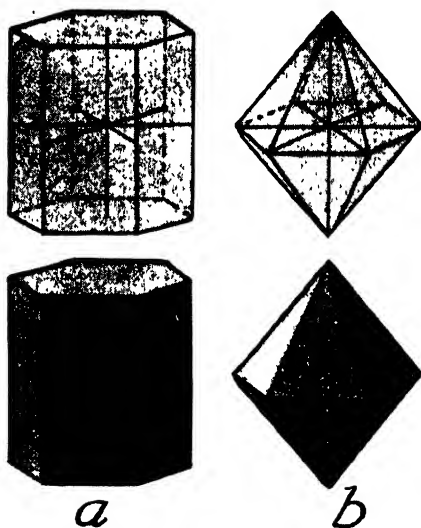


FIG 3

Crystals of the hexagonal system (a) Hexagonal prism, with terminal face a regular hexagon; (b) hexagonal pyramid whose faces are isosceles triangles

snowflakes, and calcite crystallize in this system. In Fig. 3, *a* and *b*, are shown, respectively, the hexagonal prism and double hexagonal pyramid.

(4) **Orthorhombic System.** The typical forms in this system are the rhombic prism and pyramid. In the rhombic prisms, the bases are oblongs, and the angle between two faces over one vertical edge is greater or less than

90°. Topaz and sulphur crystallize in this system. In Fig. 4, *a*, is shown a rhombic prism, and in *b*, a rhombic pyramid.

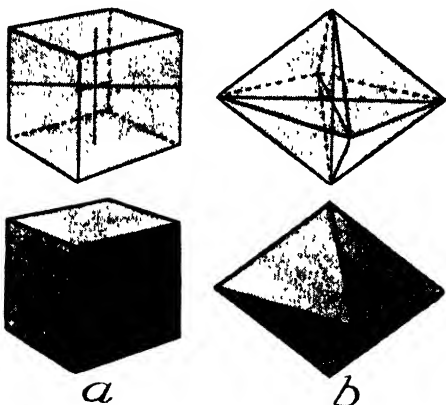


FIG. 4

Crystals of orthorhombic system, (a) Rhombic prism (b) rhombic pyramid

(5) **Monoclinic System.** The foundation of this system is an oblique rhombic prism, shown in Fig 5. Sal soda, borax, gypsum, and copperas crystallize in this system

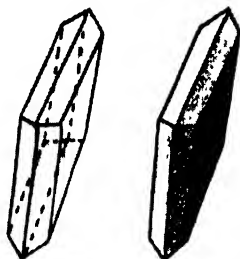


FIG. 5

Oblique prism, foundation of the monoclinic system.

(6) **Triclinic System.** In this system, there is no plane of symmetry. Likefaces are in pairs only

on opposite sides of a crystal, and all the inter-sections are oblique, as in Fig. 6. The crystals are complex. Blue vitriol and some forms of tartaric acid are good illustrations.

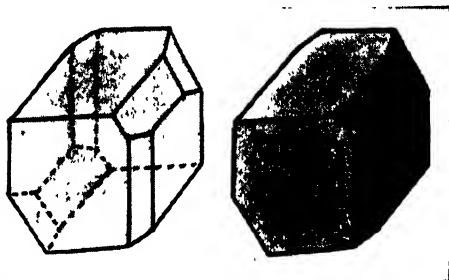


FIG. 6

Double-oblique prism of the triclinic system.

Internal Structure of Crystals. Through the application of X-rays our knowledge of the internal structure of crystals has been greatly advanced. It has been found that the external geometry of crystals is conditioned by the arrangement of the atoms within the molecule and of the molecules within the mass. Further, there is a vital connection between the crystal structure of a substance and its chemical composition. Crystallography is thus becoming increasingly important to the chemist. A.L.F.

CRYSTALLOGRAPHY, *kris' tul og' ra fie* See MINERALS.

CRYSTAL PALACE, the London exposition building of 1851. See LONDON.

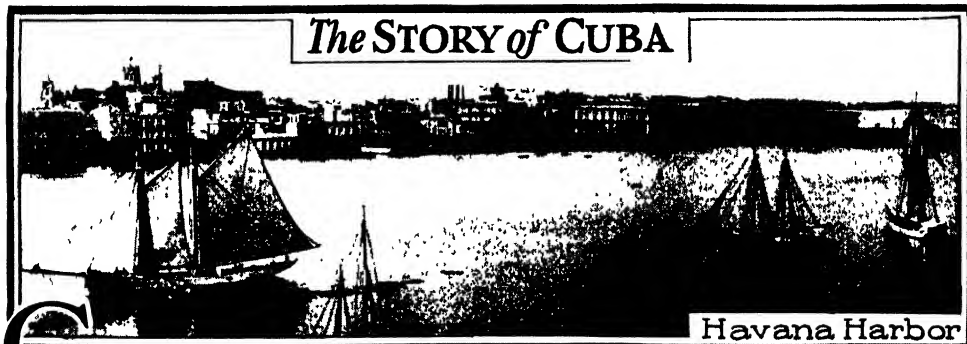
CTENOPHORA, *te nof' o rah*. See ZOÖLOGY (Divisions of the Animal World).

CTENOPHORAN, *te nof' o ran*. See JELLY-FISH.

CTESIPHON, *tes' i fon*. See AESCHINES; DEMOSTHENES.

CUAUHTEMOC, *kwa' ta mahk*. See AZTEC.

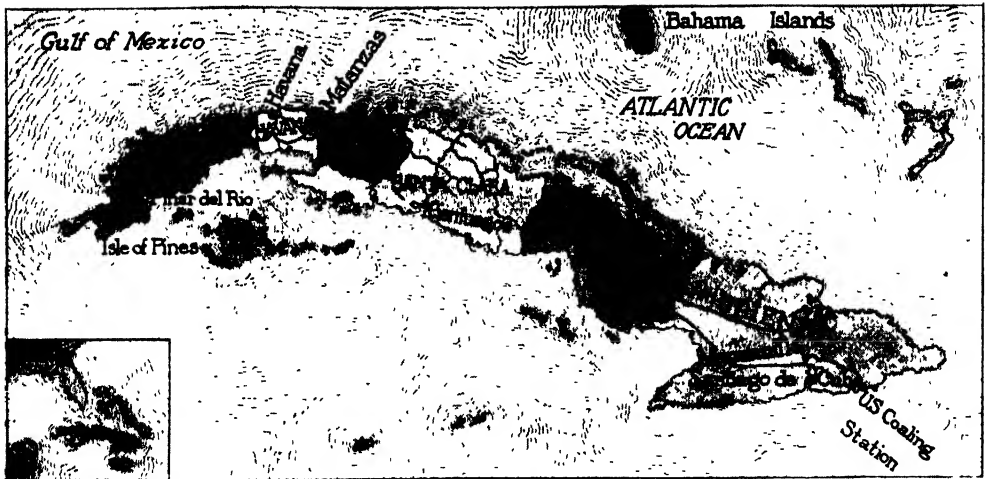
The STORY of CUBA



Havana Harbor

CUBA. This island republic, poetically called the PEARL OF THE ANTILLES because of its beauty and natural wealth, was one of the earliest American possessions of Spain, and one of the last two to slip away from

Spanish rule. For ages it has been a favorite winter resort for people of northern lands, and its history has been at times so closely connected with that of the United States as to render it especially interesting to Ameri-



THE ISLAND OF CUBA

The large map shows the provinces, chief cities, and important railroads of Cuba. The smaller one, in the corner, gives the location of the island with respect to Florida and Yucatan. See, also, colored maps in the articles UNITED STATES; NORTH AMERICA.

cans. Since 1900 it has been an independent republic, with some concessions of guardianship to the United States.

The name, a relic of the original inhabitants, now extinct, is pronounced *Kooba* by the islanders, and this is not unlikely to become the general pronunciation in North America, with the increasing intimacy of international relations, since it is a point on which some local sensitiveness has been shown.

Cuba lies at the entrance to the Gulf of Mexico, dividing the opening into two channels. It is ninety miles south of Key West, Fla., and about 130 miles east and north of Yucatan. About fifty miles to the east is the island of Haiti. Havana, the chief port and an important city, is 1,197 miles from New York and 597 miles from New Orleans. Including numerous small islands, or keys, at the north and south, and the Isle of Pines at the south, all of which are a part of Cuban territory, the area of Cuba is 44,218 square miles. It is therefore almost as large as Pennsylvania, or New Brunswick and Nova Scotia combined.

The People. The population of Cuba was 3,608,000 in December, 1929; of this total, about seventy-four per cent are whites. The remainder are chiefly negroes, with a small percentage of Chinese. It was reported that in 1919 nearly 40,000 Spanish immigrants entered the country. The prevailing religion is Roman Catholic, but Church and State are separated, and toleration is guaranteed to all beliefs. The white families have nearly all been settled for generations on the island, and were long restless under Spanish rule, for the reason that they were treated merely as provincials or dependents and excluded from participation in the executive responsibilities and

honors of the insular government; the latter were monopolized by officials from the mother country. The term *pobre Cubano* (poor Cuban), applied to them in Spain, wounded their sensibilities.

There was much of class distinction in Cuba under the rule of Spain. The wealthy were educated and refined, but no adequate provision was made for the education of the poor. The Church fostered education and charities, but the government was neglectful of both.

It will be seen that the people of Cuba, of whatever class, have been, until recently, depressed and dissatisfied with conditions, although possessing a land of beauty, fertility, and promise, and enjoying the very valuable cultural inheritance from Spain; and that the provincial character ascribed to white Cubans was artificial, rather than real. The Spanish language is everywhere spoken, and the elegance of Spanish social forms is in evidence. Also, the English tongue is employed, to a considerable extent, in the coast cities.

Principal Cities. The deeply indented coast line of this long, narrow island affords good harbors and excellent sites for the cities. Chief of these is Havana, the capital and metropolis of the republic. Cienfuegos, Santiago de Cuba, Manzanillo, Matanzas, and Trinidad are also seaports. The interior is dotted here and there with small villages, nestling among the hills and mountain ranges. The majority of the larger inland towns are situated on the main railroad, which extends the length of the island. The principal interior cities are Camagüey, Guines, Santa Clara, and Pinar del Rio. Of all the cities mentioned, however, only the following have a population of over 50,000.



TYPES OF NATIVE HOMES

At left is the residence of fairly prosperous people; at right, a typical hut of the very poor.

Camaguey, *kah' mah gway*, long known by the name of **PUERTO PRINCIPE**, is the largest interior city, and has a population of over 93,000. Midway between the north and south coasts of the island, it lies on a moderate plateau and is bordered by two small streams. It is the principal seat of the old Creole aristocracy, which prides itself on its ancient and purely Spanish lineage and on its long residence in Cuba. Camaguey was founded in 1515, and to-day contains many buildings more than a century old. Its cathedral, while much altered and extended from the original structure, has stood for about two hundred years.

The city is connected by railroad with Havana and with Santiago de Cuba, and by another line with Nuevitás, its port to the north. The raising of livestock has always been an occupation of much importance in the plain about Camaguey, and the city has been a good market for beeves, tropical fruits, choice woods, tobacco, and honey.

Cienfuegos, *syen fway' gose*, one of the island's most progressive cities, overlooking the Bay of Jagua, on the south coast, in the province of Santa Clara, 130 miles southeast of Havana. It is the fourth commercial port of Cuba and an important center of trade. The climate in winter is very agreeable, but the summer is by no means healthful, the temperature for days at a time being above 98° F. Population, 75,000; only about half are white people.

Havana. A detailed discussion of this city will be found elsewhere in these volumes.

Matanzas, the capital of the province of Matanzas, next in importance to Havana as a railroad and commercial center. It is situated on Matanzas Bay, one of the largest and best of Cuba's harbors, about fifty-two miles east of Havana, with which it is connected by rail. The cave of Bellamar, noted for its great stalactites, and the cave of Yumuri Valley, in the vicinity, attract many visitors. Population, 65,000. See **STALACTITE** and **STALAGMITE**.

Santiago de Cuba, *sahn te uh' go da koo' bah*, a seaport, capital of the province of Oriente. In commercial importance, it ranks next to Havana. Santiago has a population of 78,000. The town is situated on the Bay of Santiago, on the southeastern coast, just at the base of the Sierra Maestra Mountains. It is 470 miles directly southeast of Havana, with which it is connected by railway. Its fine, deep harbor is five miles in length, and has an average width of one and one-half miles. It is a good example of a landlocked harbor, the opening into the Bay of Santiago being in one place only 200 yards wide.

Santiago is an important shipping center, exporting from the rich territory of Oriente a great deal of iron ore and other minerals, such as copper and manganese. The agricultural exports are sugar, coffee, and tobacco. The iron mines of the district are very rich, and employ over 4,000 workmen. Most of the private dwellings are one story high and crudely built, but they are often made attractive by beautiful flower gardens.

In the Spanish-American War, hostilities centered at Santiago, because the Spanish fleet was stationed in the harbor.

Physical Features. In general, the eastern and western sections of this long, narrow island are mountainous, the loftiest point being Turquino, which rises to a height of 8,320 feet above the eastern plateau. In the center is a region of gently rolling plains, broken here and there by low, rounded hills, and it is here, rather than in the mountain sections, that Cuba's most picturesque scenery is to be found. The Yumuri Valley is the "show spot" of the island. Numerous streams drain the valleys and the coastal plains, but they are too rapid in the wet season and too shallow in the dry season to be of much use for navigation.

Climate, Vegetation, and Animals. Cuba lies just inside the torrid zone. On the coast, the climate is very even, but inland it is not so equable. The coast temperature seldom drops below 65° in winter, but in the mountains the thermometer often falls lower than 50°. Coast temperature in summer is usually not higher than 90°. The average temperature for the island in January varies between 72° and 75°. The July temperature averages about 82°.

Almost everywhere in Cuba the rainfall is sufficient for agricultural purposes, only a few small areas in the interior requiring irrigation. At Havana the total is over fifty inches annually, and in some northeastern sections it reaches over 100 inches. The southern coast regions have much less rainfall, however, for less moisture passes over the mountains. Rain falls throughout the year, but the chief rainy season comes in summer. During August, September, and October, hurricanes are apt

to occur, for Cuba lies within the path of these West Indian storms. Trade winds from the northeast prevail.

Before 1901, yellow fever and other diseases were common in the lowlands, owing to unsanitary conditions. The government, acting upon measures adopted by General Wood of the American army, during its occupation of the island, has now practically wiped out this dreaded disease.

In this warm southern land, with soil so rich that almost anything will grow, vegetation is luxuriant. Products of economic value are sugar cane, tobacco, coffee, cacao, and all tropical fruits, such as the banana, coconut, pineapple, orange, lemon, lime, date, fig, guava, and pomegranate. Palms, including the useful royal palm, grow everywhere, and fields are covered with beautiful flowers and fragrant plants. In about 13,000,000 acres of forest grow some of the finest cedar and mahogany in the world, as well as such other trees of the tropics as the ebony, logwood, and rosewood. Quail, snipe, wild turkeys, grouse, buzzards, and vultures are plentiful. Hogs, dogs, and cats run wild in great numbers.

Although there are but few snakes, there are a number of disagreeable forms of animal life. Among them are scorpions, centipedes, and tarantulas, as well as land crabs and flying cockroaches; and worst of all, the flea called the *nigua*, or *jigger*, gets under the skin. This is the side of life which is most irritating, both to natives and to visitors.

Cuban waters are well stocked with fish. Large sharks and barracuda, a more dreaded man-eater than the shark, are common, and in coast waters the porpoise and manatee, or sea cow, are found. Crocodiles, alligators, chameleons, small lizards, and tree toads are among the creeping inhabitants of this tropical land.

Commerce. Since Cuba's independence was won, in 1898, its commerce has turned largely to the United States. In recent years, four-fifths of its export trade has been with the United States and its possessions. Total imports from the United States have been about seventy-one per cent of all incoming goods. Great Britain supplies only about four per cent of the imports, but receives nearly eleven per cent of the exports. Spain, the nation which at one time had a monopoly of Cuba's commerce, and which still has the advantage of a common language, supplies only about four per cent of the imported goods and receives only one per cent of Cuba's exports.

Sugar and its by-products (molasses and alcohol) form over eighty-five per cent of the exports, and tobacco twenty per cent. The island produces twenty per cent of the world's sugar. The principal imports are pork products, farm products, cotton goods, machinery, gunny

sacks, and Chinese chow. United States money is legal tender throughout the island; however, Cuba has its own system of coinage. This includes gold pieces, corresponding to the United States gold coins; silver pieces, the peso (approximately one dollar), smaller coins, equivalent to 40-cent, 20-cent and 10-cent pieces; nickel coins, 5-, 2-, and 1-cent pieces. The metric system of weights and measures is employed.

The United States and Cuba have entered into a reciprocal treaty by which the former is given an advantage of twenty to forty per cent in duties over other nations.

Transportation. Over 1,360 miles of cart roads are open to traffic, but transportation facilities are yet insufficient. Roads are in many places bad, and in the rainy season they are almost impassable, although the Cuban government is continually improving the highways.

Cuba was twelve years ahead of the mother country, Spain, in the introduction of the railroad, the first line of about forty miles being opened in 1837, connecting Havana with Guines. By 1902 railway communication extended nearly from one end of the island to the other, and then commenced a new era of industrial and commercial opportunity. The center of the railway system is at Havana, and the principal towns of the island are connected by about 3,200 miles of railway. Large sugar estates are connected with the main lines by private lines. Cuba is linked with the United States by airplane service. Both passengers and mail are carried by airplane, and trains are ferried across between Havana and Key West.

Agricultural Development. Previous to Cuba's last war for independence (1895-1898), the country contained over 90,000 plantations, farms, cattle ranches, and orchards, valued at nearly \$200,000,000. During the war, many of these were completely destroyed, but after 1899 agricultural industries again developed. The simple wooden plow of four centuries ago is still in quite general use, and oxen are still the patient farm animals, yet the slowly moving Cubans alone produce twenty per cent of the world's supply of sugar cane. The manufacture of sugar is still carried on by costly methods; there are about 180 sugar centrals (mills) on the island, and about one-half of the cultivated lands are given over to sugar. The yearly crop has risen since 1914 from 3,000,000 tons to more than 5,000,000 tons, but the government aims to restrict production to 4,000,000 tons a year. The grinding season is between December and June.

The next product in importance is tobacco, and about one-tenth of the cultivated land is given to that crop. About seventy per cent of the output is produced in the province of Pinar

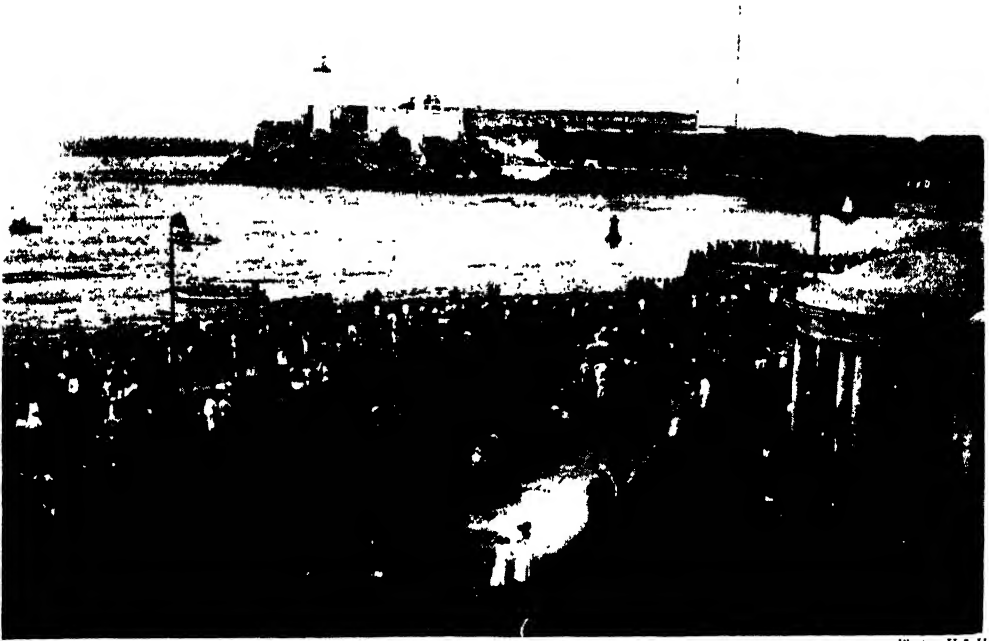


Photo U & U

MORRO CASTLE, GUARDIAN OF HAVANA HARBOR

del Rio. The tobacco crop is worth about \$40,000,000 yearly. Since prohibition became effective in the United States, the manufacture of liquors has increased nearly sixty per cent.

Corn, or maize, rice, and sweet potatoes are raised for home use. Coffee is raised, but is not so important a product as formerly; in this industry, it is becoming increasingly difficult to compete with Brazil. Fruits are easily cultivated, and fruit interests are chiefly in the hands of American companies. Almost 30,000 tons of pineapples, about 40,000 tons of bananas, and over 3,000,000 coconuts are exported yearly.

Cattle raising is an important industry, especially in the fertile province of Camagüey. There are over 4,600,000 head of cattle on the island, and about 780,000 horses, 71,000 mules, and 3,500 asses.

Manufacturing and Other Industries. The manufacture of raw sugar, cigars, and cigarettes constitute the only manufacturing industries of Cuba, and they are all closely connected with agriculture. Directly south of Havana, on the south coast of Cuba, at the little town of Batabano, the sponge industry is important.

Scarcity of labor is a problem which Cuba has to meet in most of its industries. The abolition of slavery in 1883 reduced the supply of black labor; the Chinese government stopped emigration of Chinese coolies to Cuba because

it was said they were inhumanly treated, but now they are reaching the island again, at the rate of about 2,000 each month. The labor problem is more serious to sugar planters than to manufacturers of tobacco products, for in the latter industry skilled white labor can be used.

Mineral Resources. Southeastern Cuba, near Santiago de Cuba, in the province of Oriente, is the mining section of the island. Iron, copper, and manganese are the principal products. Mining interests are chiefly in the hands of American companies; most of the output is sent to the United States, and on an average 50,000 tons of iron a month are exported to that country. Gold deposits and rich beds of asphalt are not largely worked.

Education. During Spanish rule in Cuba, education was largely controlled by the Church, but provisions made therefor were insufficient. While Americans were occupying the island (1898-1902), the school system was reorganized, and now about eighty-five per cent of the people can read. Primary education is free and compulsory. Over 436,000 pupils are enrolled in government, private, or extension schools. The University of Havana, attended by over 4,000 students, bases its curriculum on those of the universities of America and Europe.

Government. Cuba is governed in accordance with the Constitution adopted by a repre-



Photo U & U

PRESIDENTIAL PALACE, HAVANA

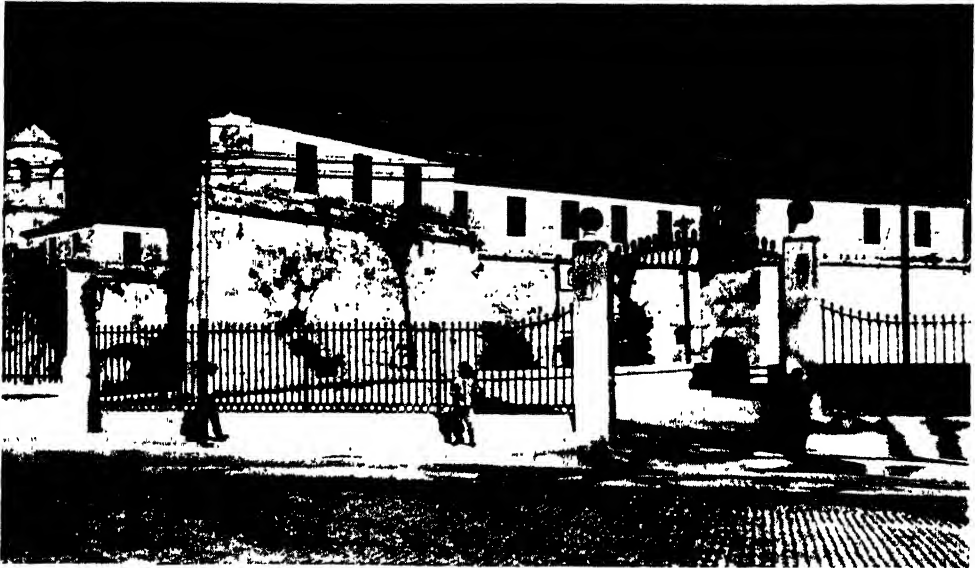
sentative convention, February 21, 1901. The government is republican in form, and differs but slightly from that of the United States, the chief difference being that the provinces of the island are of less importance politically than the states of the American Union. The head of the administration is the President, who must be a native Cuban. He is elected by popular vote for a term of four years, and cannot serve more than two consecutive terms. He appoints and removes members of his Cabinet, who are responsible to him for the administration of their departments.

Legislative power is vested in a Congress, consisting of two houses, a Senate and a House of Representatives. Four Senators from each of the six provinces form the Senate body. They are elected by a board composed of the councilmen of the province and of electors, chosen by the people, equal to twice the number of councilmen. One-half of the Senators retire every four years. The House of Representatives consists of 116 members, one for every 25,000 inhabitants or for a fraction thereof more than 12,500. They are elected for four years, one-half retiring every two years. Congress holds two annual sessions, controls the financial and foreign affairs of the republic, makes general laws for the administration of the national government, and prepares electoral laws for the provinces and municipalities.

Every male Cuban over twenty-one years of age who is mentally sound, who has not been convicted of crime, and who is not serving in the army or navy, all Spanish male residents who have been on the island since April 11, 1899, and all male foreigners who have resided there since January 1, 1899, are entitled to vote. Foreigners are required to show five years' residence before naturalization.

History. Columbus discovered Cuba in 1492. His son Diego (James) founded Santiago de Cuba in 1514. Five years later, Havana was founded. The enslavement of the native population led to its extinction in less than two generations, and negro slaves were imported from Africa. Misgovernment was the rule during nearly all of Cuba's colonial history, heavy taxes being levied upon its production and commerce for the benefit of Spain. Havana was taken by the French in 1534, and again in 1554, and in 1762 by the British in the European Seven Years' War, which ended in 1763 (see SEVEN YEARS' WAR). But all these occupations were temporary.

The first insurrection of Cubans against Spain was led in 1833 by Manuel Quesada, who demanded for the island representation in the Spanish Cortes (Congress). Peace did not come until 1842, when various reforms were conceded, though representation in the Cortes was still denied. In 1850 Narciso Lopez, with



OLDEST BUILDING IN THE WESTERN WORLD

Photo: U & U

The Old Fort (La Fuerza), in Havana, is older than the first buildings erected in the Southwest or in Florida. It dates from the second quarter of the sixteenth century, it is believed.

600 American filibusters, landed at Cardenas, to overthrow the colonial government; but the movement was quickly suppressed. In the next year, Lopez repeated his attempt, but was defeated and executed, though his American followers were pardoned. A third filibuster, in 1853, led England and France to ask from the United States a disavowal forever of an intention to take possession of Cuba, but this request was declined. The Ostend Manifesto of 1854 was not really a manifesto, but was an expression of opinion and advice by the American ministers accredited to Great Britain, France, and Spain, addressed to the government of the United States, recommending it to purchase Cuba from Spain or to seize the island, if purchase plans should fail. Spain refused to sell the island, though offered a hundred million dollars for it; and the Manifesto was repudiated by the American people.

In 1875, the United States complained to Spain that the condition of insurrection in Cuba could no longer be endured. A vigorous attempt was made by the mother country to suppress it in the following year. In 1895 a Cuban republic was proclaimed at Najassas, but the Spanish General Campos defeated the republicans at Matanzas. In the next year, the cruel General Weyler succeeded Campos, and angered the American people by his atrocities.

In 1898, the United States battleship *Maine*, while visiting Havana, was mysteriously blown up, supposedly by a submarine mine, though this was not known to be a fact. The press of the United States clamored for intervention in

behalf of the Cubans. This action followed, and a war with Spain resulted. The Spanish force was defeated by the Americans in Cuba at San Juan Hill, near El Caney, on the 1st of July; and the Spanish fleet, which had been shut in the harbor of Santiago de Cuba, was destroyed on the 3rd by the fleet of Admiral Sampson, who was absent at the time, the chief honor of the victory being accorded to Commodore Schley.

Peace was made in the following year, and Spanish claim to the island was forever abandoned. Cuba was recognized as a nation by the powers of the world, and it entered into an agreement with the United States giving the latter the right of intervention when necessary and the use of naval stations; certain stipulations were also made in 1902 as to finances and foreign relations. In 1905 intervention by the United States for the preservation of order became necessary, and the American occupation continued until 1909, when President Jose Miguel Gomez was inaugurated. In 1914 Cuba borrowed largely from American capitalists for the promotion of a considerable number of modern governmental enterprises. There is now invested in Cuba by Americans about \$1,500,000,000.

Insurrection of 1917. When President Menocal was reelected in 1917, the vote was so close between him and Alfredo Zayas that Jose Miguel Gomez, ex-President and leader of the Zayas party, demanded that the Supreme Court reverse the result and declare Zayas elected. The demand was ignored, and

OUTLINE AND QUESTIONS ON CUBA

Outline

I. Location and Size

- (1) Latitude, $19^{\circ} 40'$ to $23^{\circ} 13'$ north
- (2) Longitude, 74° to 85° west
- (3) Situation with reference to other land masses
- (4) Area
 - (a) Actual
 - (b) Comparative

II. Physical Features

- (1) Coast line
 - (a) Length, 2,500 miles
 - (b) Numerous harbors
- (2) Surface characteristics
 - (a) Mountains at east and west ends
 - (b) Undulating plain in center
- (3) Rivers
 - (a) Uselessness for navigation

III. Climate and Life

- (1) Tropic conditions
 - (a) Equalizing effects of sea
- (2) Rainfall
- (3) Unhealthfulness
 - (a) Effect of sanitation measures
- (4) Vegetation
- (5) Animal life

IV. Industries

- (1) Agriculture
 - (a) Primitive methods
 - (b) Chief crops
 1. Sugar cane
 2. Tobacco
 3. Coffee

4. Fruits

- (c) Stock raising
- (2) Manufacturing
 - (a) Sugar
 - (b) Cigars and cigarettes
 - (c) Labor problems
- (3) Mining
- (4) Lumbering

V. The People

- (1) Proportion of various races
- (2) Customs and manners
- (3) Religion
- (4) Education
 - (a) Under Spanish rule
 - (b) Under present-day conditions

VI. Commerce and Transportation

- (1) Commercial centers
- (2) Imports
- (3) Exports
- (4) Railroads
- (5) Highways and cart roads

VII. Government

- (1) Republican form
- (2) Departments and their duties
- (3) Conditions of citizenship

VIII. History

- (1) Discovery and settlement
- (2) Repeated insurrections against Spain
- (3) Interference of the United States
- (4) Independence secured
- (5) Recent progress

Questions

- What is Cuba's opinion of United States money?
- About how many miles would a letter have to travel in going from New York City to Havana? How much would you have to pay to send it?
- What country grants a subsidy to Cuba's parcel-post business?
- In what part of the island is the temperature highest?
- With what foreign country does Cuba enjoy regular airplane service?
- May a man other than a native Cuban become President of the republic?
- To what happening did the slogan, "Remember the Maine," owe its origin?
- How large a part of the world's supply of sugar cane does Cuba produce?
- How far is Havana from New Orleans?
- What part had people from the United States taken in Cuba's fight for freedom before 1898?
- What were the conditions under which the Cubans lived during the Spanish rule?

Gomez threatened the government with attack and Menocal with death. The two parties were loosely termed conservatives, under Menocal, and radicals, under Gomez.

The radicals prepared to gather in force to seize the machinery of government and assure themselves of power to name his successor, but in January the government discovered and frustrated a plot to kidnap President Menocal. Skirmishes which cannot be dignified as battles occurred between the regular forces of the republic and the revolutionists, in nearly all of which the former were victorious. Suspected traitors were forced from the army, four city mayors were arrested, and loyal militia companies were organized.

In the meantime, Cuba followed the lead of the United States and declared war upon the German Empire on April 8, 1917. While there was little opportunity for Cuba to take an active part in the struggle, the great help was the stimulation of the production of sugar.

In anticipation of the 1920 Presidential electoral difficulties, a new electoral law was drawn up, with the assistance of Major General Crowder, U S A., and passed by Congress in 1919. This law was disregarded, however, and in the year of the 1920 election sentiment was again at high pitch. When Zayas was declared elected (May, 1921), Gomez and his followers refused to accept the results. The United States, by virtue of its right, reserved when the republic was organized, found it necessary to send the Cubans a warning that insurrection must cease. In the same year, the United States again intervened in a financial crisis, and prosperity gradually returned. It was during Zayas' administration (1925) that the ownership of the Isle of Pines was decided in favor of Cuba. Zayas refused to turn to violence in overcoming the Presidential electoral difficulties which again arose in 1924. General Gerardo Machado, the Liberal candidate, defeated Menocal, and assumed office on May 20, 1925. He was host to President Coolidge in 1928, when the latter visited the Pan-American Union.

Due to the fact that most of the parcel post business into Cuba is from the United States, the government of the latter country grants a subsidy to the Cuban postoffice system, to cover a part of the delivery expense



CUBAN COAT OF ARMS

Left of shield, 2 white stripes, 3 blue; right, green and blue; flags, red field, white star, stripes blue and white; sun, yellow, branch, green, with red berries, liberty cap, red

Alcohol is an important by-product of the sugar industry. It is now being developed as a fuel for motor cars, and in Cuba is in sharp competition with gasoline for internal-combustion engines.

R.R.A.

Related Subjects. The following articles in these volumes contain much information which will be of help to the reader interested in Cuba

GEOGRAPHICAL

Havana

Isle of Pines

HISTORY

Columbus, Christopher

Gomez y Baez, Maximo

Filibusters

Ostend Manifesto

Garcia y Iniguez, Calixto

Palma, Thomas Estrada

Spanish-American War

LEADING PRODUCTS

Banana

Pineapple

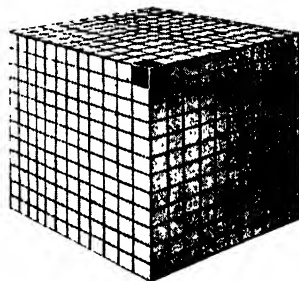
Coconut

Sugar

Coffee

Tobacco

CUBE, a regular solid having six equal square faces. By *solid* is meant a body having three dimensions—length, breadth, and thickness. In finding the *volume* or contents of a solid, that is, the *space* it occupies, the cube is used as a unit of measure, and the result is expressed in cubic inches, cubic feet, etc. The volume of a cube is found by using three times as a factor the number which expresses the length of one of its edges; that is, a cube whose edge is 4 inches in length contains $4 \times 4 \times 4$, or 64, cubic inches. For this reason, the third power of any number, which is the product of that number taken three times as a factor, is called its cube; for example, the cube of 2 is 8; the cube of 3 is 27.



A CUBE

The figure, reduced in size, represents a cubic foot. Each face is twelve inches in length and width. The volume is $12 \times 12 \times 12$ inches, or 1,728 cubic inches. The small black cube is one-twelfth of the length, breadth, and thickness, or one cubic inch. There are 1,728 such small cubes in the entire body

reason, the third power of any number, which is the product of that number taken three times as a factor, is called its cube; for example, the cube of 2 is 8; the cube of 3 is 27.

J.W.Y.

Related Subjects. For practical application of the theory of the cube and its relations, see the following articles

Cube Root

Cubic Measure

Mensuration

CUBEBS, the dried, unripened berries of a shrub belonging to the pepper family. They are used in Eastern countries as a flavoring, and in Europe and American for medicinal purposes. The shrub is native to Penang, Sumatra, New Guinea, and neighboring islands. The dried berries look much like black pepper, but are less pungent and of more agreeable flavor

than that spice. The drug prepared from cubebs acts as a stimulant, and is sometimes used in treating indigestion. When prepared in the form of cigarettes, cubebs are sometimes thought to afford relief for hay fever, asthma, and pharyngitis. B.M.D.



PARTS OF CUBE B PLANT

(a) Branch; (b) flower; (c) berry growing from flower stalk.

Scientific Name. The plant belongs to the family *Piperaceae*. Its botanical name is *Piper cubeba*.

CUBE ROOT. When it is desired to find the length of one of the sides of a cube, that fact is usually ascertained by actual measurement. If, however, the number of cubic units in the volume of the cube is known, the length of any side may be found by figuring the *cube root* of the number representing the volume. The cube root of a number is one of its three equal factors, as illustrated below. The knowledge of how to find the cube root of large numbers is not of great practical importance to the average person, but such problems have considerable value for mental discipline, and they are interesting exercises to anyone with a taste for mathematics. We will begin this subject with a study of the roots of small numbers:

$2 \times 2 \times 2 = 8$; 8 is the *cube* of 2, and 2 is the *cube root* of 8.

$12 \times 12 \times 12 = 1728$; 1728 is the *cube* of 12, and 12 is the *cube root* of 1728.

The cube of 6 is written 6^3 . The small figure 3 is called the *exponent*.

The cube root of 216 is written $\sqrt[3]{216}$. The \sqrt is called the *root sign*, or *radical sign*.

How to read the indicated operations:

I. 6^3 may be read in full, as follows:

- Multiply 6 by 6, and that product by 6;
- Use 6 as a factor 3 times;
- The third power of 6;

(d) The cube of 6;

(e) 6 cubed.

II. $\sqrt[3]{64}$ is read as follows:

(a) What number used as a factor 3 times gives 64? It can be seen clearly this way: $n \times n \times n = 64$. What is n ?

(b) Cube root of 64.

It may be written $n^3 = 64$ and read, "What number cubed gives 64?" This use of n should be common in the arithmetic class; it is very helpful in making things clear, but should be read "number" or "what number," not read "n."

Exercise in reading:

(1) $4^3 = 4 \times 4 \times 4 = 64$.

(4 used as a factor three times is $4 \times 4 \times 4 = 64$.)

(2) $6^3 = 6 \times 6 \times 6 = 216$.

(6 cubed is $6 \times 6 \times 6 = 216$.)

(3) $8 \times 8 \times 8 = 8^3 = 512$.

$9 \times 9 \times 9 = 9^3 = 729$.

(Read just as they appear.)

(4) $n \times n \times n = 27$.

What number used as a factor 3 times gives 27?

(5) $n \times n \times n = 216$;

$n = 6$.

6 used 3 times as a factor gives 216,

or $6 \times 6 \times 6 = 216$.

(6) $n^3 = 27$;

$n = 3$.

This is read, "What number cubed gives 27?"

"3 cubed gives 27, or,

$3 \times 3 \times 3 = 27$."

(7) $\sqrt[3]{27} = 3$.

This is read, "The cube root of 27 is 3."

Cube and Cube Root of Common Fractions. Following are examples illustrating this phase of cube root:

$$\left(\frac{1}{2}\right)^3 = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}.$$

$$\sqrt[3]{\frac{1}{8}} = \frac{1}{2}.$$

$$\left(\frac{2}{3}\right)^3 = \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} = \frac{8}{27}.$$

$$\sqrt[3]{\frac{8}{27}} = \frac{2}{3}.$$

$$\left(\frac{4}{5}\right)^3 = \frac{4}{5} \times \frac{4}{5} \times \frac{4}{5} = \frac{64}{125}.$$

$$\sqrt[3]{\frac{64}{125}} = \frac{4}{5}. \quad \text{Proof: } \frac{4}{5} \times \frac{4}{5} \times \frac{4}{5} = \frac{64}{125}.$$

$$\sqrt[3]{\frac{27}{64}} = \frac{3}{4}.$$

$$\text{Proof: } \frac{3}{4} \times \frac{3}{4} \times \frac{3}{4} = \frac{27}{64}.$$

$$\sqrt[3]{\frac{8}{125}} = \frac{2}{5}.$$

$$\frac{2}{5} \times \frac{2}{5} \times \frac{2}{5} = \frac{8}{125}.$$

$$\sqrt[3]{\frac{125}{216}} = \frac{5}{6}.$$

$$\frac{5}{6} \times \frac{5}{6} \times \frac{5}{6} = \frac{125}{216}.$$

$$\sqrt[3]{\frac{27}{1000}} = \frac{3}{10}.$$

$$\frac{3}{10} \times \frac{3}{10} \times \frac{3}{10} = \frac{27}{1000}.$$

The cubes of the tens from 10 to 90 can be easily learned by memorizing the cubes from 1 to 9.

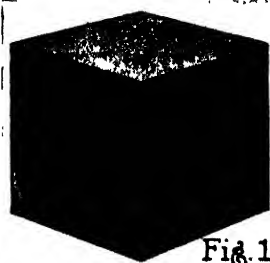


Fig. 1



Fig. 2

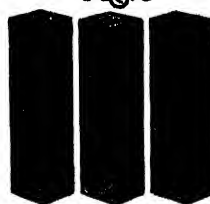


Fig. 3



Fig. 4

PARTS OF A CUBE

Fig. 1, at left, represents the cube of the tens; Fig. 2, left center, the square of the tens times the units, taken three times; Fig. 3, right center, the tens times the units, taken three times; Fig. 4, at right, the cube of the units

$1^3 = 1.$	$10^3 = 1000.$
$2^3 = 8.$	$20^3 = 8000$
$3^3 = 27.$	$30^3 = 27000$
$4^3 = 64.$	$40^3 = 64000$
$5^3 = 125.$	$50^3 = 125000.$
$6^3 = 216.$	$60^3 = 216000.$
$7^3 = 343.$	$70^3 = 343000.$
$8^3 = 512.$	$80^3 = 512000$
$9^3 = 729.$	$90^3 = 729000.$

Volume in cubic inches = 8×1728 .

Edge in inches = $\sqrt[3]{8 \times 1728} =$

$$\sqrt[3]{(2 \times 2 \times 2) \times (12 \times 12 \times 12)}.$$

Edge in inches = $2 \times 12 = 24$

$$\sqrt[3]{27 \times 216} = \sqrt[3]{3 \times 3 \times 3 \times 6 \times 6 \times 6} = 3 \times 6 = 18.$$

$$\sqrt[3]{512 \times 343} = 8 \times 7 = 56.$$

$$\sqrt[3]{729 \times 125} = 9 \times 5 = 45.$$

Cube and Cube Root of Decimal Fractions. The cube of the decimal fraction offers no new difficulty. A product contains as many decimal places as all its factors contain; for example, $.6 \times .6 \times .6 = .216$. Therefore, from the above we have:

$.1^3 = .001.$	$.01^3 = .000001.$
$.2^3 = .008.$	$.04^3 = .000064.$
$.3^3 = .027.$	$.09^3 = .000729.$
$.5^3 = .125.$	
$\sqrt[3]{.125} = .5.$	$\sqrt[3]{.729} = .9$
$\sqrt[3]{.125} = .5.$	$\sqrt[3]{.729} = .9$
$\sqrt[3]{.000125} = .05.$	$\sqrt[3]{.000729} = .09.$

In all the above problems, it is possible to get the cube root at sight or by a little careful inspection and trial.

Cube Root by Factoring. The next simple method is that of factoring, where the three equal factors are not so apparent. For example:

- (1) $\sqrt[3]{15625} = n.$
 $15625 = 5 \times 5 \times 625.$
 $5 \times 5 \times 625 = 5 \times 5 \times 5 \times 125$
 $5 \times 5 \times 5 \times 125 = 5 \times 5 \times 5 \times 5 \times 25.$
 $\sqrt[3]{15625} = 25.$
- (2) $\sqrt[3]{4096} = n.$
 $4096 = 4 \times 1024.$
 $4 \times 1024 = 4 \times 4 \times 256.$
 $4 \times 4 \times 256 = 4 \times 4 \times 16 \times 16.$
 $\sqrt[3]{4096} = 16.$

We can find the cube root of an indicated product by factoring. For example, "What is the edge in inches of a cubic space whose capacity is 8 cubic feet?"

The above problems are all solved more or less freely by inspection.

Cube Root of Numbers Consisting of 10's and Units. We shall see first how such numbers are cubed and of what their cubes consist; then we can understand how to find the cube root of a number.

Let us cube 26.

$$26 = 20 + 6.$$

$$26^3 = (20 + 6)^3, \text{ or}$$

$$26^3 = (20 + 6) \times (20 + 6) \times (20 + 6).$$

$$\begin{array}{r} 20 + 6 \\ 20 + 6 \\ \hline 20^3 + (20 \times 6) \\ + (20 \times 6) + 6^3 \\ \hline 20^3 + 2 \times (20 \times 6) + 6^3 \\ \hline 20^3 + 2 \times (20^2 \times 6) + (20 \times 6^2) \\ + (20^2 \times 6) + 2 \times (20 \times 6^2) + 6^3 \\ \hline 20^3 + 3 \times (20^2 \times 6) + 3 \times (20 \times 6^2) + 6^3 \end{array}$$

Therefore:

$$26^3 = 20^3 + (3 \times 20^2 \times 6) + (3 \times 20 \times 6^2) + 6^3.$$

Translating this into words, we have: "The cube of a number is made up of the cube of the tens, and 3 times the square of the tens times the units, and 3 times the tens times the square of the units, and the cube of the units."

The figure on next page shows these parts together as the whole cube.

Following this truth, we write out the cube of 38, and have: $38^3 = 30^3 + (3 \times 30^2 \times 8) + (3 \times 30 \times 8^2) + 8^3$

Putting the general truth into concise form, we have: $(\text{tens} + \text{units})^3 = \text{tens}^3 + (3 \times \text{tens}^2 \times \text{units}) + (3 \times \text{tens} \times \text{units}^2) + \text{units}^3$.

Or, using t for tens and u for units, we have:

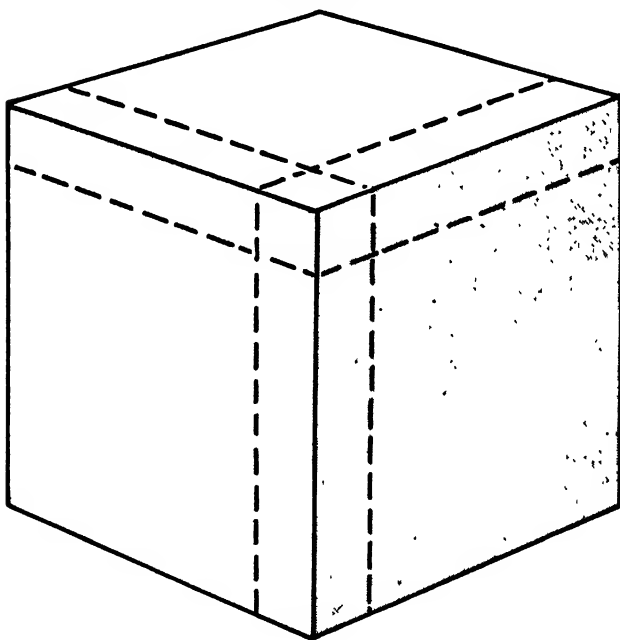
$$(t + u)^3 = t^3 + (3 \times t^2 \times u) + (3 \times t \times u^2) + u^3.$$

From this we are able to find the cube root of a number, as follows:

Let us take 941192. Some number has been cubed to give this. It is indicated thus:

$$\begin{array}{r}
 n^3 = 941192 \\
 n = \sqrt[3]{941192} \\
 \text{The process of finding the cube root:} \\
 90 + 8 \\
 \underline{941192 = t^3 + (3 \times t^2 \times u) + (3 \times t \times u^2) + u^3} \\
 720000 = t^3 \\
 \hline
 3 \times 90^2 = 24300 \quad 212192 = (3 \times t^2 \times u) + (3 \times t \times u^2) + u^3 \\
 24300 \quad 194400 = 3 \times t^2 \times u \\
 \hline
 17792 = (3 \times t \times u^2) + u^3 \\
 17280 = 3 \times t \times u^2 \\
 \hline
 512 = u^3 \\
 512 = 8^3
 \end{array}$$

"What is the largest cube of tens in the number?" Thinking of 941000 (which contains the 10's cubed) as 941, we find 720, or 9^3 , the largest cube. Nine is



$$t^3 + 3(t^2 u) + 3(t u^2) + u^3$$

THE COMPLETED CUBE

the cube root of this, but 9 tens is 90, and $90^3 = 72000$, which we take out; the remainder, 212192, must contain the rest of the cube, namely $(3 \times t^2 \times u) + (3 \times t \times u^2) + u^3$. Since the first term, $3 \times t^2 \times u$, is much the largest part of the remainder, we may for the moment consider $212192 = 3 \times t^2 \times u$. We have the product of three numbers and have two known numbers, 3 and 90, to find u , the one not known, as expressed in the following:

$$212192 = 3 \times 8100 \times u.$$

Therefore, to find u , we divide 212192 by 24300, and find $u = 8$. Now we take out $3 \times t^2 \times u$ or $3 \times 90^2 \times 8$, and have left 17792, which must contain $(3 \times t \times u^2) + u^3$, the rest of the cube. We take out $3 \times t \times u^2$ or $3 \times 90 \times 64$ or 17280, and have left 512, which equals

8^3 or u^3 . So we have found that 941192 is the cube of 98 or $\sqrt[3]{941192} = 98$. This is the simplest method for those not familiar with algebra. For more advanced students, the problem may be worked as follows:

$$\begin{array}{r}
 90 + 8 \\
 941192 = t^3 + 3t^2u + 3tu^2 + u^3 \\
 720000 = t^3 \\
 \hline
 3t^2 = 24300 \quad 212192 = (3t^2u + 3tu^2 + u^3)u \\
 3tu = 2160 \quad 212192 \\
 u^3 = 64 \\
 \hline
 26524
 \end{array}$$

First find the largest cube of tens, which is seen to be 720, and the cube root, 9 tens or 90, take out 90^3 , and there is left 212192, which must contain the other three terms of the cube; that is,

$$212192 = 3t^2u + 3tu^2 + u^3, \text{ or}$$

$$212192 = (3t^2 + 3tu + u^2)u.$$

Since $3t^2u$ is much the largest part of the three quantities, we may for a moment neglect the other two and have $212192 = 3t^2u$. We have the product of three numbers and two of them given to find the third. We find u by dividing 212192 by 3×90^2 and get $u = 8$. Then we substitute 90 for t and 8 for u in each part inside the parentheses and get the entire divisor as shown, 26524. This multiplied by u , or 8, gives 212192. This shows that we find in 941192 the cube of 98. Therefore, 98 is the cube root of 941192, or $\sqrt[3]{941192} = 98$.

The usual method followed after the subject is understood is given below, accompanied by an illustration:

$$\sqrt[3]{373248} = n$$

$$\begin{array}{r}
 72 \\
 373248 \\
 \underline{343} \\
 30248 \\
 \underline{30248} \\
 4 \\
 15124
 \end{array}$$

Separate the number into periods of three digits each, beginning at the right. Find the largest cube in the first period, 373. It is 343. Place its cube root,

7, in the answer. Subtract the largest cube, 343, and bring down the next period. Divide the remainder by three times the square of the tens (in this case $3 \times 70^2 = 14700$), and place the quotient (2 in this case) in the answer beside the number already there; in this case this gives 72 in the cube root. Then add to the trial divisor (as $3 \times \text{tens}^2$ is called) three times the tens times the units, which in this case is $3 \times 70 \times 2 = 420$, and add also the square of the units, which in this case is 4. Then multiply the sum of these three, which is the real divisor, in this case 15124, by the units, which in this case is 2, and place the product under the dividend. The product, 30248, is the same as the dividend, and 72 is the cube root of 373248.

Another illustration, when there are three digits in the root:

$$\begin{array}{r} \sqrt[3]{187149248} = n \\ \underline{572} \\ 187149248 \\ \underline{125} \\ 62149 \\ 3 \times 50^3 = 7500 \\ 3 \times 50 \times 7 = 1050 \\ 7^3 = 49 \\ \underline{8590} \\ 60193 \\ 1056248 \\ \underline{1056248} \\ 078124 \end{array}$$

The only new point in this problem is that 57 becomes the tens at the second division, and the divisor, 4×1000 , becomes 3×5700 .

Cube Root of Decimals. In taking the cube root of a number containing a decimal, we separate it into periods, beginning at the decimal point, and marking off into periods of three digits each, to the left for the whole number and to the right for the decimal, as,

$$67'842 \ 368'795.$$

If the decimal part has not 3, 6, or 9, etc., places, zeros are added, as:

$$\begin{array}{l} 32 \ 687'40. \\ 32 \ 087'400. \end{array}$$

The cube root of a decimal has $\frac{1}{3}$ as many decimal places as the cube has. The cube is the product of three equal factors; therefore, it contains three times as many decimal places as the cube root. If a given number is not a perfect cube, annex decimal zeros, in groups of threes; carry it out as many decimal places as is desired. For example:

$$\sqrt[3]{750} = \sqrt[3]{750 \ 000'000'000},$$

which will give the cube root to three decimal places

Cube Root of Common Fractions. This is touched upon in the early part of the article, but we shall generalize it here:

$$\left(\frac{7}{8}\right)^3 = \frac{7}{8} \times \frac{7}{8} \times \frac{7}{8} = \frac{7^3}{8^3} = \frac{343}{512}$$

$$\text{Therefore, } \sqrt[3]{\frac{343}{512}} = \frac{\sqrt[3]{343}}{\sqrt[3]{512}} = \frac{7}{8}$$

The cube root of a common fraction is a fraction whose numerator is the cube root of the numerator of the first fraction, and whose denominator is the cube root of the denominator of the first fraction, as,

$$\sqrt[3]{\frac{216}{343}} = \frac{\sqrt[3]{216}}{\sqrt[3]{343}} = \frac{6}{7} \quad \sqrt[3]{\frac{a^3}{n^3}} = \frac{\sqrt[3]{a^3}}{\sqrt[3]{n^3}} = \frac{a}{n}$$

CUBIC MEASURE, the system used in the measurement of solids, that is, bodies having the three dimensions of length, breadth, and thickness. It derives its name from the cube, which is the unit of measure employed in finding the contents, or volume, of solids (see CUBE). The volume of a rectangular solid is found by multiplying together the numbers representing its three dimensions.

Practical Applications. The following table, which should be memorized, contains the values commonly used in the solution of problems based on the cube:

1728	cubic inches (cu. in.)	= 1 cubic foot (cu. ft.).
27	cubic feet	= 1 cubic yard (cu. yd.).
231	cubic inches	= 1 gallon.
2150.4	cubic inches	= 1 bushel.
24 $\frac{1}{2}$	cubic feet	= 1 perch of stone

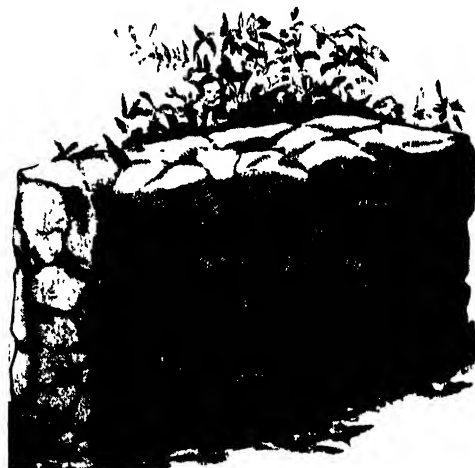
(a) How many cubic yards will be taken out in digging a cellar 15 feet wide, 40 feet long, and 8 feet deep?

(b) What will it cost to build a stone wall 30 rods long, 3 $\frac{1}{2}$ feet high, and 1 yard thick, at \$6.50 a perch?

(c) How many bushels of oats will a bin hold which is 2 yards long, 2 $\frac{1}{2}$ feet wide, and 5 feet, 4 inches high? How many gallons of water would a tank of equal size contain?

Short Methods. The following rules will be found helpful in the quick solution of various practical problems:

(1) To find the *approximate* number of cubic feet in a log, multiply the area of the middle section by the length, measured in square feet and feet, respec-



A CORD OF STONE

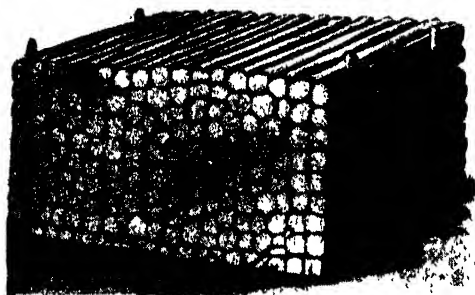
tively. [This rule gives a good approximation, as long as the diameters of the two ends of the log do not differ widely.]

(2) A full-sized cord of wood is a solidly built pile 8 feet long, 4 feet wide and 4 feet high, containing $8 \times 4 \times 4$, or 128, cubic feet.

(3) A cord of stone will make approximately 100 cubic feet of wall.

(4) Three bushels of lime and one cubic yard of sand will lay a cord of stone.

Practical Problems. (a) How many cubic feet are there in a log 40 feet long, 15 inches in diameter at one end, and 18 inches at the other? (To find the



A CORD OF WOOD

area of any section use this rule: The area of a circle is equal to 3 1416 times the square of the radius.)

Solution of (a). 15 inches = $1\frac{1}{4}$ feet 18 inches = $1\frac{1}{2}$ feet. The diameter of the middle section is $\frac{1}{2}(1.25 + 1.50) = 1.375$ feet; the radius, therefore, = .6875 feet $3.1416 \times (.6875)^2 = 1.4851$ square feet. Hence, $\log = 1.4851 \times 40 = 59.404 = 59.4$ cubic feet, approximately

(b) In stove-wood measure, each stick is 16 inches long. How many loads of stove wood measuring 8 feet long, 16 inches wide, and 4 feet high could be made from a full-sized cord of wood?

(c) If the full cord is bought for \$3.00 and sawed into stove lengths, as in problem (b), and sold for \$1.50 a load, what is the profit, if \$.75 is allowed for the cost of cutting?

Solution of (b) and (c). Since the full-sized cord is 4 feet (48 inches) wide, as many loads of 16-inch wood can be made from it as $48 \div 16$, or 3. The stove wood is sold for $3 \times \$1.50$, or \$4.50. The profit is therefore $\$4.50 - \$3.00 - \$.75$ or \$.75

Measures for Crops. (1) A ton of dry hay is estimated at 500 cubic feet to the ton. To find the number of tons in a mow, multiply the length in feet by the height in feet and then by the width in feet and divide the result by 500.

(2) To find the number of tons in a stack, multiply the width in feet by the length in feet by $\frac{1}{2}$ the height and divide by 500.

(3) To find the contents of a round stack, multiply the distance around the stack in feet by itself and then multiply by 4 times the height in feet, striking off two places from the right of the result thus obtained. This gives the number of cubic feet in the stack, and by dividing by 500, the number of cubic feet occupied by a ton of dry hay, the number of tons is found. If the dimensions of the stack are given in yards, the same process should be followed, except that at the end the cubic contents of the stack should be divided by 185 instead of 500. There are 18.5 cubic yards in the space occupied by a ton of hay.

(4) To find the contents of a crib in bushels of shelled corn, multiply the number of cubic feet in the crib by 8 and strike off the right-hand figure; that is, divide by 10. This is equivalent to eight-tenths of the number of cubic feet in the crib. One cubic foot of space holds eight-tenths of a bushel of shelled corn.

(5) To find the number of heaped bushels of ear corn contained in a crib, multiply the number of cubic feet in the crib by 4 and strike off the right-hand figure. This is equivalent to taking four-tenths of the number of cubic feet, and is correct because one cubic foot holds about four-tenths of a bushel of ear corn.

(6) When the sides of the crib are flared, that is, wider at the top than at the bottom, it is necessary to take the average width in estimating. Take one-half the sum of the top and bottom widths as the average. Multiply this figure by the height, and then multiply by the length. The result will be the cubic volume of the crib. Then, to find the number of bushels of ear corn, multiply this result by 4 and strike off the right-hand figure.

Practical Problems (a) How many tons of hay are there in a mow 30 feet long, 10 feet high, and 20 feet wide?

Solution of (a). $30 \times 10 \times 20 = 6,000$, number of cubic feet in the mow. $6,000 \div 500 = 12$, number of tons.

(b) A stack is 20 feet long, 10 feet high, and 15 feet wide. How many tons does it contain?

(c) How many tons in a circular stack 20 yards around and 5 yards high?

(d) A crib 18 feet long, 10 feet high, and 8 feet wide is filled with shelled corn. How many bushels does it hold?



A CORN CRIB

If this structure is eight feet wide at the top of the door and five feet wide at the bottom, the average width is six and one-half feet.

Solution of (d) $18 \times 10 \times 8 = 1,440$, number of cubic feet in crib. $1,440 \times 8 = 11,520$. Striking off the right-hand figure, we have 1,152, number of bushels the crib will hold.

(e) How many cubic feet of earth are removed in digging a ditch 624 feet long, 2 feet wide, and $2\frac{1}{2}$ feet deep?

(f) A room is 40 feet by 32 feet by 14 feet. How many cubic feet of air space does it contain?

(g) A swimming pool is 70 feet long and 25 feet wide. If it is filled with water to a depth of 4 feet 6 inches, how many cubic feet of water does it contain?

J.W.V.



DANCE AT THE SPRING

If the picture is held at some distance from the eye, the figures assume clearer form. (From a painting by Francis Picabia.)

CUBIST SCHOOL OF PAINTING, a school of modern art, whose adherents prefer to interpret natural forms rather than to copy or imitate their generally accepted outward appearance. It dates from 1913, and is closely related in time to the Post-Impressionist Movement (see **IMPRESSIONIST SCHOOL OF PAINTING**). By a well organized design, utilizing geometric forms, cubes, angles, and parallelograms the Cubist seeks to set on canvas an abstract rather than a "photographic" expression.

As one critic has said: "He takes the elements of expression from the forms and colors of nature, and uses them not to represent objects but to produce an organism which will contain in terms of art what a given subject means to him in terms of sensation."

The Cubist has shown the possibility of an expression in painting without representation, a process familiar for centuries in music. Like all movements, this type of art has suffered at the hands of extremists, notoriety-seekers, and incompetents, but in the main it represents a sincere effort to produce truer and finer painting than was done by the majority of artists in the past century. Its exponents, many of whom were originally academic artists of rank, seek strength in their painting, at the expense of every other quality.

Pablo Picasso was the founder and leading exponent of Cubism; one of his most famous paintings is *The Woman with the Mustard Pot*. Other eminent followers were Marcel Duchamp, noted for his *Nude Descending a Staircase*;

and Francis Picabia, represented by his *The Dance at the Spring*. Picasso, who is now rated by leading authorities as a modern master, has ceased to paint in the cubistic style. G.S.T.C.

CUCKOO, *kuk' oo*, a name derived from the delightful singing notes of a European bird affectionately called "the darling of the spring." The name is applied to this bird and to numerous other birds of the same family, though not all are sweet songsters like the European cuckoo. There are two common North American species—the *black-billed* and the *yellow-billed*. They are retiring birds, but their presence in thickets or bushes is revealed by their peculiar calls—a succession of rather harsh notes sounding like *kuk kuk*. The cuckoos are slender birds about a foot in length, with long, rounded tails and long, sharp, arched bills. Their toes, two pointing forward and two backward, are especially adapted to cling-



Photo Visual Education Service

BLACK-BILLED CUCKOO

ing rather than to climbing. Their feathers are a beautiful olive-brown, with a bronze tint. The chief difference in the two species is in the color of bill; however, the black-billed species has red circles about its eyes and the yellow-billed has white "thumb-nail" marks on its tail. The cuckoos have been named *rain crows*, from the belief that their calls, when heard frequently, are an indication of rain. The birds are known to delight in damp, cloudy weather.

These cuckoos make their homes in wooded land, swamps, and orchards. They build rather untidy nests, but hatch their own eggs, which are green-blue, unpolished, and two to seven in number.

This domesticity is not a trait of the European cuckoo, for that bird either lays its eggs in the nests of other birds, or, as has been claimed, places them there with its bill and leaves them to be hatched by the foster-mother. The cowbird (which see) also has the peculiar habit of laying its eggs in the nests of

other birds. The American cuckoos deserve man's protection, for they feed on noxious insects, particularly hairy caterpillars that many other birds leave alone. D.L.



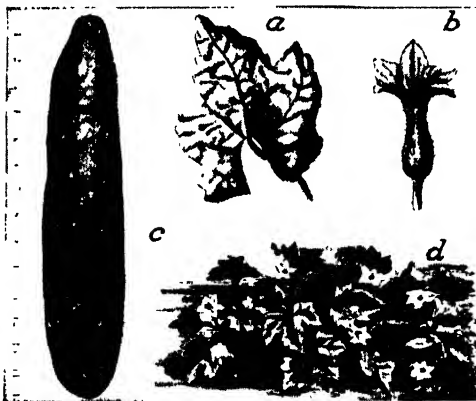
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YELLOW-BILLED CUCKOO

Scientific Names. The cuckoos belong to the family *Cuculidae*. The yellow-billed is *Coccyzus americanus*; the black-billed, *C. erythrophthalmus*. The common European species is *Cuculus canorus*.

CUCUMBER, a garden vegetable, oblong and oval in shape, used green as a salad and for pickling. It probably originated in Northern India at least three thousand years ago; since that time it has passed from country to country and is now widely cultivated in nearly every part of the temperate zones.

The melonlike vine which bears the fruit has a rough trailing system, with tendrils for climbing; hairy leaves with three to five pointed lobes; and short-stalked, yellow, bell-shaped



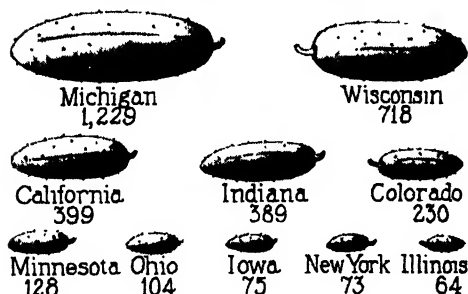
THE CUCUMBER

(a) Leaf; (b) flower; (c) fruit; (d) vine.

flowers, the male and female flowers both on the same vine. The vegetable itself, according to the species, grows from four to thirty inches long. It contains numerous flattened seeds, in a somewhat watery pulp. Cucumbers are

picked for use before ripe, for if allowed to turn yellow and to ripen, they are tough and very full of seeds. Like tomatoes, they are soaked in water before being peeled; thick pieces are then removed from the ends and sides, as the skins contain unwholesome juices. After the peeled portion is sliced, salting removes more of the undesirable juice and makes the cucumbers more digestible. Served as a salad with cream dressing, the vegetable is as nutri-

Thousands Of Bushels



CUCUMBER PRODUCTION

Figures represent average crop for a three-year period. From United States government reports

tious as fresh celery. Small cucumbers used for pickling are sometimes called *gherkins* (see PICKLES).

Cucumbers require a rich, moist, warm loam, and as they are very sensitive to frost, they are often grown under glass, to supply the early summer demand. Indoors, the seed should be planted in March; outdoors, from April to July, one-half ounce of seed being required for 100 feet. The seed should be planted one inch deep. It is usually planted in little hills, enriched with well rotted manure, and about six feet apart each way.

The striped cucumber beetle is a common and injurious insect enemy of the plant. It not only eats the stems and leaves, but carries disease from one plant to another. Lead arsenate, with the addition of Bordeaux mixture, is an effective insecticide (see INSECTICIDES AND FUNGICIDES). The bacterial wilt is one of its more frequent communicable diseases. B.M.D.

Scientific Name. The cucumber belongs to the gourd family, *Cucurbitaceae*. Its botanical name is *Cucumis sativus*.

CUD. See CATTLE (Loss of Cud).

CUGNOT, NICHOLAS. See LOCOMOTIVE.

CULEBRA, koo la' bra, CUT (now GAILLARD CUT). See BLASTING; PANAMA CANAL (A Trip through the Canal).

CULEX, ku' leks, the common mosquito. See MOSQUITO.

CULION, koo li on', LEPER COLONY. See LEPROSY.

CULLINAN DIAMOND. See DIAMOND (Famous Diamonds); GEM.

CULLODEN MOOR, a battlefield in Scotland. See SCOTLAND (History).

CULLOM, kul 'um, SHELBY MOORE (1829-1914), an American statesman whose career is fittingly summarized in the title of the book *Fifty Years of Public Service*, which he published in 1911, three years before his death. He was born in Wayne County, Ky., was admitted to the bar in 1855, and became a lawyer at Springfield, Ill. Soon a leader in Illinois politics, he was several times elected to the state legislature, and sat in the national House of Representatives for three terms, after 1865. As a delegate to the National Republican Convention of 1872, he placed General Grant in nomination for the Presidency. Between 1876 and 1883 he was governor of Illinois, and in the latter year entered the United States Senate as a Republican. To this body he was reelected for every term until the one beginning in 1913. Cullom was the author of the Interstate Commerce Law, and served for many years as chairman of the Senate Committee on Interstate Commerce. In 1898 he was one of the commissioners to establish American government in Hawaii.

In 1913 he accepted his last public appointment, that of commissioner in charge of the Lincoln Memorial at Washington, D. C. No other service could have been more pleasing to him than this, for he had been one of Lincoln's personal friends.

Related Subjects. In the article LINCOLN, ABRAHAM, is shown an illustration of the Memorial. See, also, INTERSTATE COMMERCE LAW.

CUMBERLAND, MD. See MARYLAND (back of map).

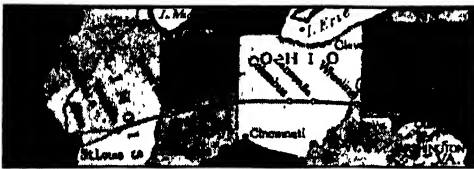
CUMBERLAND, R. I. See RHODE ISLAND (back of map).

CUMBERLAND GAP. See CUMBERLAND MOUNTAINS.

CUMBERLAND MOUNTAINS, the name given that division of the Appalachian Mountain system which extends across the eastern part of Tennessee and forms the boundary between Virginia and Kentucky. The region covered by the division is a plateau about 2,000 feet high and fifty miles wide, on which rise several ranges of hills or low mountains to the height of 500 or 600 feet. The slopes of the plateau are steep. The region is covered with forests of chestnut, oak, ash, and other hard woods. An opening through these mountains where Kentucky, Virginia, and Tennessee meet is the celebrated "Cumberland Gap," through which early settlers traveled westward into Kentucky and Tennessee, and which was traversed by both the Confederate and the Union forces during the War of Secession.

CUMBERLAND RIVER, a large tributary of the Ohio River, rises in the highlands in Southeastern Kentucky, flows westward into Tennessee, and after making almost a half-circle in that state, returns to Kentucky and mingles its waters with those of the Ohio, in the northwestern part of the state. Its winding course is 688 miles in length, and its drainage basin is over 18,000 square miles in area. At the Great Falls, in Whitley County, Ky., the river makes a sudden descent of sixty-three feet; below the falls the stream plunges over a series of rapids, the Great Shoals, for a distance of ten miles, descending to a level course between beautiful bluffs that gradually decrease in height. Throughout the year, the Cumberland is navigable as far as Nashville, a distance of 193 miles. See KENTUCKY (Its Rivers).

CUMBERLAND ROAD, a government highway, called also the NATIONAL ROAD, and known at first as the GREAT NATIONAL PIKE. It was projected in response to a demand for a better route from the East to the West, in view of rapid settlement beyond the Ohio River. As finally built, it extended from Fort Cumber-



MAP OF THE CUMBERLAND ROAD

land, on the Maryland frontier, to Vandalia, Ill., a distance of 800 miles. As it was for many years the chief line of travel for thousands of Eastern settlers who were making their way westward, the Cumberland Road was an important factor in the development of the West and Southwest. The original plan was to construct the road from funds obtained by the sale of public lands in the states through which it passed, but it soon became necessary to call on Congress for additional appropriations, and between 1806, the year in which construction work began, and 1838, there were voted sums amounting to \$6,821,246.

It was largely due to the efforts of Henry Clay that Congress advanced this money, and in recognition of his services a monument to him was erected on the road near Wheeling, W. Va. Because of the increasing importance of the railroads in stimulating westward immigration, construction work on the government highway was stopped in 1840. Each of the various states through which it passed was eventually given control of that portion of the road included within it.

With the advent of the automobile, the road was further improved. It is now paved from

Washington, D. C., to Saint Louis, Mo., and is known as the National Old Trails Road. See OHIO (Transportation).

CUMMINS, ALBERT BAIRD (1850-1926), an American lawyer and political leader, was born on February 15, 1850, at Carmichaels, Pa. After attending the academy in the neighboring town of Waynesburg, he studied surveying and became a railroad civil engineer. He later studied law, was admitted to the bar of Illinois in 1875, and practiced in Chicago for three years. In Des Moines, which became his home in 1878, he was soon conspicuous as a Republican orator and campaign organizer.

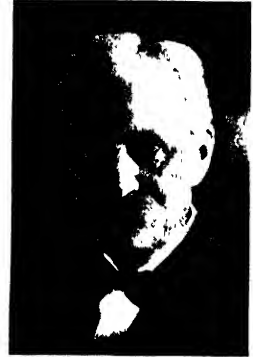


Photo U & U

ALBERT B. CUMMINS

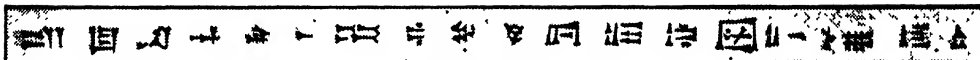
He refused to leave the Republican party in 1912, although he was in sympathy with the progressive movement.

Cummins first became a national figure about 1900, as the chief sponsor of the "Iowa idea," which called for a reduction in the existing high tariffs. In 1902, 1904, 1906, and again in 1908 he was elected governor, but resigned a month before the end of his third term, to become United States Senator. He made a thorough study of corporation control, and brought about advanced trust legislation in his state. In the Senate, he joined the steadily growing progressive group, but did not accept its ultra-liberal ideas.

CUMULUS, *ku' mu lus*. See CLOUD.

CUNAXA, *ku nak' sah*, BATTLE OF. See CYRUS, THE YOUNGER.

CUNEIFORM, *ku ne' ih form*, **INSCRIPTIONS**, the name given to the wedge-shaped characters used in one of the earliest forms of writing known to man. *Cuneiform* is from the Latin word *cuneus*, meaning a *wedge*. This system of writing originated in Babylonia at a remote and unknown date, and was invented by a primitive race of people called Sumerians, who developed it from a crude form of picture-writing. From stone they turned to clay as a writing material, using a sharp-pointed instrument, or *stylus*, which was triangular in shape, and which made wedge-like impressions in the soft clay. In this way, cuneiform characters originated. Adopted by the Semitic Babylonians, about 4500 B.C., cuneiform writing was taken over by the Assyrians and other peoples of Western Asia and by the Egyptians, and was in use until the first century before the Christian Era. The inscriptions were made both on clay tablets and on stone.



CUNEIFORM CHARACTERS

The above, translated, reads: "She put me in a basket of rushes, with pitch my door she shut."

Each sign employed consists of a wedge or a combination of wedges written from left to right. The wedge points to the right, downward or aslant, and sometimes two are joined to form an angle. Cuneiform writing is difficult to translate, because a character may represent a whole syllable or a word, and the system is therefore extremely complicated. Of the various forms of this writing, the Persian is the simplest, because each sign stands either for a word or for a consonant and a vowel. The Assyro-Babylonian system is the most complicated and also the most important, because of what it has revealed to the modern world of the history of the ancients, and especially of peoples mentioned in the Bible.

Though Herodotus, Plutarch, and other ancient writers referred to cuneiform texts, they seem to have passed out of the remembrance

the Babylonian inscriptions, and since then marked progress has been made in this field of investigation. There are, however, thousands of cuneiform texts yet to be deciphered.

CUNNINGHAM CLAIMS. See ALASKA (Development of Coal Lands).

CUPELLATION, *ku pe la' shun*. See ASSAYING.

CUPID, *ku' pid*, the god of love of classic mythology, represented in sculpture and painting as a beautiful, chubby, naked boy, with gauzy wings and a roguish, dimpled face, and armed with a bow and quiver of arrows. He is represented as the son of Mars, god of war, and of Venus, the goddess of love. The legend is that he loved a mortal princess named Psyche, who after many trials was made immortal by the gods. As Cupid is the emblem of the heart, Psyche is the symbol of the soul. See PSYCHE.



Photo Visual Education Service

CUPID
In the Capitoline Museum,
Rome.

Long ago, Cupid was at times represented with a helmet, a spear, and a buckler, and riding on the back of a lion or on a dolphin, to show his power. The Greek *Eros* is identified with Cupid as the god of love. See PSYCHE.

In Literature. No other character of mythology has been adopted more generally into the literature and sentiment of the present day. Frequently mentioned as *Dan Cupid*, this "archer of archers" is usually spoken of as blind or blindfolded. Shakespeare in *Midsummer Night's Dream* says.

Love looks not with the eyes, but with the mind;
And therefore is winged Cupid painted blind

CUPID AND PSYCHE, *si' ke*. For origin of the story, see NOVEL; also CUPID.

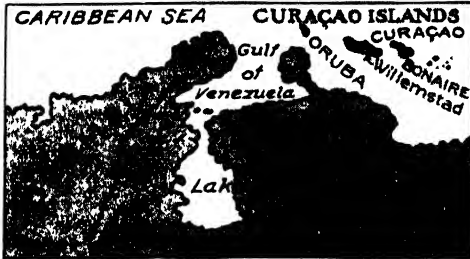
CUPOLA, *ku' po lah*, a word derived from the Latin *cupula*, meaning a *little bowl*, or *cup*. It is applied in architecture to a roof resembling an inverted bowl. Some authorities use the terms *cupola* and *dome* synonymously, while others apply the former term only to small domes (see DOME). Sometimes, too, the inner vault of a large dome is called a cupola. The common use of the term for a small lookout on top of a roof is an incorrect one.

MEANING	Outline Character 4500 B.C.	Cuneiform 2500 B.C.	Assyrian 700 B.C.	Babylonian 500 B.C.
The sun				
God, heaven				
Mountain				
Man				
Ox				
Fish				

EXAMPLES OF CUNEIFORM WRITING

of man until the fifteenth century, when European travelers became interested in the famous inscription of Darius, carved 300 feet above the ground on the steep side of Behistun Rock, in Western Persia. On this lofty cliff Darius had recorded his achievements, in three languages, Persian, Susian, and Babylonian. The deciphering of Persian cuneiform writing was begun in 1802 by a German scholar, Georg Grotefend, who succeeded in making out the name Darius in the inscriptions found in the ruins of Persepolis, the ancient capital. In 1838 Sir Henry Rawlinson made an epoch-making translation of a considerable portion of the Persian inscription at Behistun, and six years later the translation of the Susian text was begun by Westergaard. Other scholars, including Rawlinson, succeeded in interpreting

CURAÇAO, OR **CURAÇOA**, *koo rah so'*, or *koo rah sah' o*, the name of a colony in the Dutch West Indies, in the Caribbean Sea, north of Venezuela. It consists of two groups of islands. The largest of these is Curaçao, covering an area of 210 square miles; it is commercially important and is the center of a thriving Dutch colony. All the islands are for



the most part flat and of coral formation, though there are peaks rising to a height of 1,200 feet. Sugar, corn, fruits, and tobacco are raised. The principal mining products are salt and phosphate of lime. The colony is administered by a governor, appointed by the Crown of the Netherlands, with headquarters at Willemstad, the capital. Population of all the islands, 57,000. See NETHERLANDS, THE.

CURASSOW, *ku' ra so*, or *ku ras' o*, a large, handsome bird resembling the domestic fowl, a native of tropical America. The *crested curassow* of Guiana, Mexico, and Brazil is best known. It is nearly as large as a turkey, but more striking in appearance. The plumage is black, with a purplish-green gloss above and on the breast, the under parts being white. The golden crest feathers are curved forward and can be raised or lowered at will. The bird's strong bill is surrounded at the base with a skin in which nostrils are pierced. Curassows are easily domesticated, and their flesh is good to eat. Large flocks are seen on branches of trees in South American forests, where they feed on nuts, berries, and tender leaves. D.L.

Scientific Name. Curassows belong to the family *Cracidae*, which includes the guans (see GUAN). The crested curassow is *Crazelektor*.

CURB, THE. See STOCK EXCHANGE.

CURCULIO, *kur ku' lih o*, the common name of a large family of snout beetles (see BEETLE), including some of the most destructive pests of nut and fruit trees. The most important of the fruit pests is the *plum curculio*, widely known for its devastation of plum, peach, apricot, cherry, and apple crops. It is found generally in the United States east of the Rocky Mountains. The adult insect is a thick-bodied, brownish beetle with gray and black markings, a long snout, and angled feelers, and is about a quarter of an inch in length. The beetles come

from their winter homes in the bark of tree, or cracks in buildings when fruit trees commence to bloom. The plum curculio spends the winter in the woods. It then feeds on the tender buds, blossoms, and foliage. When fruit appears, the female beetle digs a hole in the pulp with her long beak, deposits an egg, presses it down with her snout, and then cuts a crescent-shaped flap around the egg. There the egg hatches into a fat, whitish grub which feeds on the pulp, generally around the stone. In most cases, "wormy" fruit falls from the tree when the grub is ready to develop into the pupal state, which is passed in the ground.

Fruit which is infested with curculio grubs can be shaken from the tree, together with mature beetles, and caught on a cloth and destroyed. In that way, injury by the pest can be reduced. For a period of five or six weeks after the leaf buds open, the foliage should be kept covered with arsenate of lead spray, two pounds to fifty gallons of water W J S.

Classification. The plum curculio belongs to the family *Curculionidae*, and is classed as *Conotrachelus nenuphar*.

CURFEW, *kur' fu*, the ringing of a bell which, as Gray expressed it in his *Elegy*, "tolls the knell of parting day." The ringing of the curfew is a custom which originated as a protection against fire, but in modern usage aims to reduce crime and protect children. Through the success of a curfew ordinance introduced in Omaha, Neb., about 1880, similar rules were adopted at various times by over 3,000 cities and towns of the United States, some remaining in force, however, for but a short period. After the ringing of curfew, at eight or nine o'clock in the evening, children under fifteen years of age would not be allowed on the streets without the written consent of parents or guardians, or unless accompanied by an adult.

In England, the custom was introduced by William the Conqueror during the Middle Ages. At the ringing of the curfew, the literal meaning of the French word, *to cover fire*, was observed, for all lights were extinguished and outdoor occupations ceased. In 1103 the law was repealed by Henry I, but the bell continued to be rung in many places, and is still heard in small towns. See BELLS (Uses).

A Poetic Theme. That the custom was observed in England in the time of Cromwell is assumed from Rose Hartwick Thorpe's much-quoted poem, *Curfew Must Not Ring To-night*. It tells the thrilling story of a girl who saved her lover by swinging on the



CURCULIO

About eight times actual size. Correct adult length is about one-fourth inch.

tongue of the church bell to prevent its sounding his doom, for he was to die at the ringing of the curfew And when—

It was o'er; the bell ceased swaying, and the maiden stepped once more
Firmly on the dark old ladder where for hundred years before
Human foot had not been planted. The brave deed that she had done
Should be told long ages after, as the rays of setting sun
Crimson all the sky with beauty, aged sires with heads of white,
Tell the eager, listening children,
"Curfew did not ring that night "

CURIATA. See COMITIA.

CURIE, *ku re'*, **PIERRE** (1859-1906), and **MARIE SKŁODOWSKA** (1867-), French scientists who by combined research discovered the wonderful element radium (which see). Professor Curie was born in Paris and was educated at the Sorbonne, where he later became professor of physics. His wife, whose achievements have made her the world's greatest woman scientist, is of Polish descent, and was also educated in Paris. Their joint discovery of radium, announced in 1898, brought them immediate recognition from the scientific world. In 1903 they were awarded the Davy Medal of the Royal Society and one-half of the Nobel prize for that year for physics. Professor Curie died in 1906, but his wife continued her researches. She succeeded her husband as professor of physics at the Sorbonne, and in 1911 received the Nobel prize in chemistry. In 1921 she visited the United States, was enthusiastically received in scientific circles, and presented with \$100,000 worth of radium, which she indicated would be used in further research. Madame Curie was accompanied by her two daughters. A second visit was made in 1929.



Photo: U & U

MADAME CURIE

CURLED MAPLE. See BIRD'S-EYE MAPLE.

CURLEW, *kur' lu*, a long-legged bird with long, slender, downward-curved bill. Curlews belong to the snipe family. In the Americas, several species are seen the year round, from Patagonia to Arctic regions. The most common, known as the *long-billed curlew*, is about twenty-four inches long, including its slender, eight-inch bill. With this it drags small crabs and shellfish from wet sands, and snails and worms from the ground. On the prairies it

snatches grasshoppers, beetles, and berries. Its plumage is pale brown or buff above, mottled with black and dark brown, and cinnamon



Photo: Visual Education Service

ESKIMO CURLEW

and white below. The limbs are slender and partly naked; the tail is short and rounded.

More common on the coasts, but rarely seen in the interior, is the *Hudsonian curlew*, a smaller bird; the nearly extinct *Eskimo curlew* is still smaller. The curlews are wading birds, but often build their nests away from water. They have suffered much from hunters' guns during their migrations.

D.L.

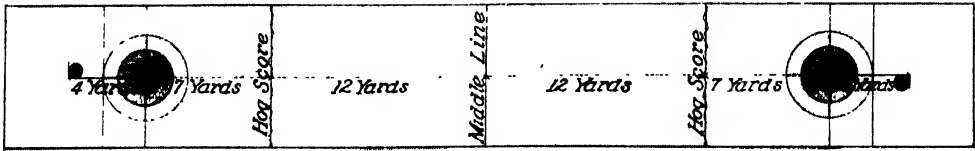
Scientific Names. Curlews belong to the family *Scolopacidae*. The long-billed curlew is *Numenius longirostris*, the Hudsonian, *N. hudsonicus*, the Eskimo *N. borealis*.

CURLING, *kur' ling*, a game played on the ice, one which has been popular in Scotland



POSITION FOR DELIVERY

for more than three centuries and has been adopted in Canada and the United States; in Canada, especially, it has become a national



FIELD MEASUREMENTS

winter sport. The game has increased so much in favor that international matches are annually played between Canada and the United States. A *bonspiel*, as a curling tournament is called, is the chief winter attraction in many Canadian cities.

The game is played on a rink marked out on the ice, with large, smooth stones which weigh from thirty to forty-five pounds, and to which handles are fixed. It might be called bowls on ice, as the rules and methods of curling are quite similar to those governing the game of lawn-bowling. There are usually four players on a side, or team. Each player uses two stones, which he slides along the ice toward a mark, called a tee, thirty-eight or forty-two yards distant. The object is for a player to

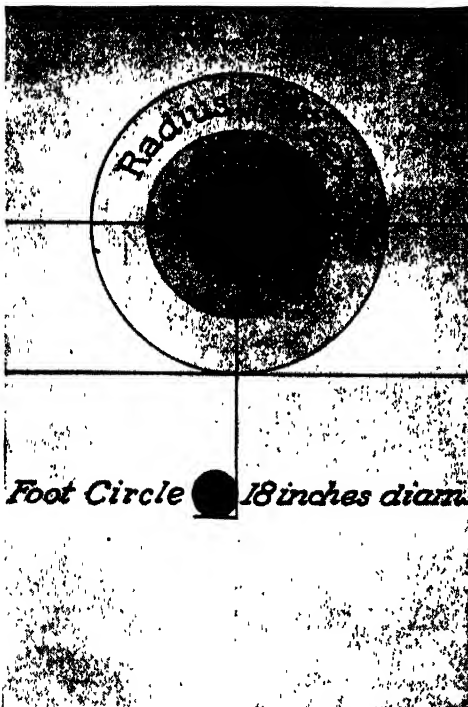
having stones nearest the mark scores a point for each stone so placed. In Canada and the United States, iron curlers are sometimes used instead of stones.

CURRANT, a small, smooth, tart berry, widely cultivated in gardens in the cooler parts of the world. Currants grow in grape-like clusters on low, bushy shrubs, and belong to the saxifrage family, being closely related



THE CURRANT

Branch, fruit, and cross section of fruit.



ENLARGED END OF FIELD

lay his stones closer to the mark than those of his opponents. One important feature of the game is the sweeping of the ice; numerous other rules enter into the game. After all players have "curled," or played, the side

to the gooseberry. The species chiefly cultivated for fruit are the *red currant* and the *black currant*; the former is the type most commonly used in America for jellies, jams, and wines, while the black currant, which has rather a pronounced flavor, is more popular in Europe and Canada. White and yellowish currants are cultivated varieties of the red currant, and are sweeter than the parent fruit. They are more adapted for use as a fresh dessert, eaten with sugar. Both the red and black currants are native to Northern Europe, and both are readily grown in the cold regions of North America. Many varieties have been developed by horticulturists.

Currants are propagated from cuttings, but new varieties are derived from seeds. The plants are hardy and will sometimes thrive even when neglected, but they make their best growth in rich, mellow, well drained soil having considerable moisture near the surface. The shallow roots of currants do not thrive in dry, hard-surfaced soil. In commercial practice, the bushes are given frequent and shallow cultivation. Pruning of old shoots to allow room for the new fruiting stems is also necessary. The imported currant worm, which also attacks gooseberries, is a serious enemy of currant bushes. Arsenate of lead is sprayed on the plants to kill the worms, which are larvae of a sawfly. After the fruits begin to

ripen, powdered hellebore is dusted on the bushes. B.M.D.

Scientific Names. The name *currant* properly belongs to a small, seedless variety of grape used in buns, cakes, and puddings (see GRAPE). The word is a corruption of *Corinth*, the name of an ancient city in Greece from which the fruit was first distributed to Western Europe. The scientific name of this fruit is *Vitis vinifera*.

The bush currants described above belong to the family *Saxifragaceae* and to the genus *Ribes*. The red currant is *R. rubrum*; the black, *R. nigrum*. There are several wild species native to North America that are sometimes cultivated. *R. aureum*, called the *golden*, or *Missouri flowering currant*, is popular as an ornamental species, because of its fragrant yellow flowers.

CURRENCY. See MONEY.

CURRENT, ELECTRIC. Current electricity is electricity in motion, and an electric current is a flow of electricity through or over a conducting substance. The force which causes the flow is called the *electromotive force* (which see), and it may be likened to the pressure which causes the flow of water through a pipe. In fact, the many points of resemblance between electrical effects and the movement of water gave rise to the use of *current*, *flow*, and other terms borrowed from hydraulics. The reader should always bear in mind, however, that electricity is not a fluid. We know, now, that it exists in the form of minute grains of matter which are constituents of atoms. The negative units (*electrons*) and positive units (*protons*) are always present in countless numbers in every bit of matter (see ELECTRICITY). It is when the normal relations between these units are changed that a body exhibits electrical effects. A flow of current through a metal conductor is known to be a stream of electrons which have been separated from their atoms. It is customary to speak of generating an electric current, but in reality electrons have been driven out of their atoms and made to move, and the result is an expenditure of energy. In other words, chemical or mechanical energy has been transformed into electric energy. Electricity itself is inherent in matter, and it is energy that is generated. These points should be kept in mind when the older terminology is used.

Production and Measurement. Electric current flows only over a closed conducting path, or complete circuit. In order that the current may continue to flow, there must be a constant source of electromotive force (e.m.f.). The most important devices for causing electrons to move over a circuit are the generating dynamo and the electric battery. In the former, mechanical energy is transformed into electric energy, and in the latter there is transformation of chemical energy into electric energy (see ELECTRIC BATTERY and DYNAMO for detailed

explanation). The flow is maintained only so long as there is a difference of potential between the ends of the conductor, *potential* referring to the electrical condition of each terminal. When the two terminals are in different electrical states, an e.m.f. or pressure is said to exist, and this pressure on the circuit causes electrons to move from one terminal to the other, and back again.

The e.m.f. of a circuit is numerically equal to the work done when a unit quantity of electricity is carried around the complete circuit. The e.m.f. and potential difference (p.d.) are the same just at start of the flow. In a cell or other current generator where the current encounters resistance, there is a fall of potential around the circuit. The e.m.f. is equal to the sum of all the falls of potential between different points around the circuit; if we divide the e.m.f. by the intensity of the current, we get the total resistance. Intensity of current is measured in amperes; e.m.f. is measured in volts, and resistance is measured in ohms. These terms are explained elsewhere under their respective titles. Their mutual relationships are expressed in the following

law: $I = \frac{E}{R}$; where I = current in amperes, E = the e.m.f. in volts, and R the resistance in ohms.

[A volt is the e.m.f. needed to drive a current of one ampere through a resistance of one ohm]

The e.m.f. of an electric battery or other generator is called its *voltage*. That of a single dry cell (explained under ELECTRIC BATTERY) is about 1.5 volts. If a number of such cells are connected in series, so that the negative plate of one is connected with the positive plate of the next, and so on, then the total voltage measured between the terminal plates is the sum of the separate voltages. A battery of ten dry cells has a voltage of 10×1.5 volts, or 15 volts.

Effects of Electric Currents. The great electrical inventions that have transformed living conditions, industry, and commerce within the past century were made possible by the heating, chemical, and magnetic effects of electric currents. Electrical conductors produce heat through the resistance they offer to the flow of the current. Metals of high resistance are used in electric stoves and other devices. When a conductor of high melting point becomes sufficiently heated to give off light, it can be used for illumination, as in the incandescent lamp. In electroplating, copper-refining, and other examples of electrolysis, we have illustrations of the chemical effect of electric currents. The magnetic effect of currents is utilized in the construction of electromagnets and of generating dynamos and electric motors. These properties of cur-

rents are all explained in detail in these volumes under appropriate headings (see list at close of article).

Direction of Currents. A direct current is one that flows continuously in the same direction, like that produced by an electric battery. An alternating current is one that reverses its direction at periodic intervals, flowing first in one direction and then in the opposite. Alternating current is produced in generating dynamos by the relative movement between a conducting system and a magnetic system. Whenever electrical conductors cut across the lines of force about a magnet, an electromotive force is induced in the conductors. In the dynamo, the conducting system is revolved around a structure carrying one or more electromagnets, or the magnetic system is revolved around the conductors. Alternating current is changed to direct current in an electric generator by means of a device called a *commutator*. H.S.E.

Related Subjects. The reader is referred in these volumes to the following articles

Ampere	Electromagnetism
Dynamo	Electroplating
Electric Battery	Electrotyping
Electric Bell	Ohm
Electric Heating	Radio Communication
Electricity	Storage Battery
Electric Light	Telegraph
Electric Motor	Telephone
Electric Railway	Transformer
Electrolysis	Volt

CURRENTS, OCEAN. See OCEAN, subtitle.

CURRIE, ARTHUR W., Sir (1875-), commander of the Canadian forces in Europe in the World War (which see). He was born in Middlesex County, Ontario; his education was obtained in the local schools and in the Strathroy Collegiate Institute. After graduation he taught school in British Columbia for several years, then entered the insurance and real estate business in that province.



SIR ARTHUR CURRIE

His military career began in 1895, when he became a private in the First Regiment of the Canadian Garrison Artillery of British Columbia. Here he rose to the rank of lieutenant colonel, and was transferred in 1913 to the Fiftieth Gordon Highlanders of Canada, at Victoria. In the first week of the World War, he enlisted for European service, reported at Camp Valcartier, Quebec, with his regiment, was commissioned brigadier general, and was

sent to Northern France. His brigade won undying fame at the second battle of Ypres in April, 1915. Five months later, Currie was made commander of the First Canadian Division of overseas troops, and in June, 1917, he was made commander of all Canadian forces in Europe. His divisions were continually in desperate fighting which marked them as among the stubbornest soldiers the Germans ever faced. He was made a Companion of the Order of the Bath by His Majesty, George V; France honored him with the decoration Croix de Commandeur and enrolled him Commandeur in the Legion of Honor. In 1920 he accepted the presidency of McGill University.

CURRY, JABEZ LAMAR MONROE. See STATUARY HALL.

CURTIS, CHARLES (1860-), a member of the Senate of the United States, from Kansas, and leader of his party in that body, was



Photo. U.S.A.

CHARLES CURTIS

Vice-President of the United States, succeeding Charles G. Dawes in 1929

elected to the office of Vice-President of the United States in 1928. His career advanced him from Indian campfires on the Kansas

plains to one of the greatest honors a nation can bestow.

Curtis was born in North Topeka, Kan., the son of a French-Canadian-American father and a mother of Kaw Indian descent. Left in childhood in the care of his father's relatives, Curtis fled to join his Indian grandmother in the encampment of the Kaws. She sent him back to Topeka. There he later became famous throughout the west as a jockey; he worked his way through high school, made a record as an orator, and entered a local law office immediately after leaving school.

He was admitted to the bar in 1881, and at the age of twenty-four was elected to the office of prosecuting attorney of Shawnee County. In 1891, he was elected to the national House of Representatives. In 1907, the resignation of Senator J. Ralph Burton resulted in the choice of Curtis to fill out the unexpired term. He was reelected for the periods of 1907-1913, 1915-1921, and 1921-1927. While Henry Cabot Lodge was Republican leader of the Senate, Curtis was his assistant; after Lodge's death, Curtis was advanced to the post.

CURTIS, CYRUS HERMAN KOTZSCHMAR (1850-), an American magazine publisher, born in Portland, Me. At the age of twenty-six, he went to Philadelphia, and founded a farm paper, the *Tribune and Farmer*; later, he purchased the *Saturday Evening Post*, founded by Benjamin Franklin, and built it up to a position of world-wide influence. He established *The Country Gentleman*, a monthly farm journal, and in 1926, purchased the New York *Evening Post*.

CURTIS, GEORGE WILLIAM (1824-1892), an American essayist, editor, and lecturer, was born in Providence, R. I. In his youth, he was interested in the Transcendental movement (see TRANSCENDENTALISM), and for two years lived at Brook Farm (which see). In 1850 he began a brilliant career in New York City. He became associate editor of *Putnam's Magazine*, and for this periodical and for *Harper's Monthly* he wrote a series of popular essays. For the latter paper, he created one of its most popular departments, "The Editor's Easy Chair."

Curtis became political editor of *Harper's Weekly* in 1863, and made that journal a power in shaping public opinion. He was one of the founders of the Republican party.



Photo. Brown Bros.

GEORGE WILLIAM CURTIS

CURTIS ACT. See INDIAN TERRITORY.

CURTISS, GLENN HAMMOND (1878-), the inventor of the flying boat, an American whose name stands next to that of the Wright brothers in the list of famous contributors to the science of air navigation (see AIRCRAFT). He holds many patents for bi-plane devices.

A boyhood interest in bicycle racing led to Curtiss's flying career. After winning a number of contests with the old-style pedal bicycle, he invented a motorcycle, on which in 1906 he traveled a mile in 26½ seconds, a speed of over 136 miles per hour, the fastest up to that time traveled by man. Success in building light but powerful motors induced him to try airplaning. In 1906 he won the *Scientific American* trophy for a flight of over a mile; in 1900, the Gordon Bennett cup for a flight at Rheims, France, at a speed of nearly forty-seven miles an hour; and in 1910, a \$10,000 prize for a flight from New York to Albany, 142 miles, with only three stops. He then turned his attention to the manufacture of airplanes and the development of flying boats. In 1914 he made a flight in the famous Langley machine, built in 1903, before the first Wright fliers, but never before successfully operated. With the aid of J. N. Willys of automobile fame, he expanded the Curtiss factories to meet wartime demands. In 1919 a Navy-Curtiss flying boat made the first flight across the Atlantic Ocean. See WRIGHT, ORVILLE and WILBUR; LANGLEY, S. P.

CURVE. In popular language, a curve is a line which bends without ever forming angles. The term has other meanings in mathematics, too technical for discussion here. Curved lines are widely used in textbooks and official reports to represent variations in temperature, population, rainfall, etc. In baseball, the term is used in connection with a ball so thrown that its course is a curve which varies from that ordinarily taken, the variation being due to a peculiar rotation of the ball and the resisting power of the air. In Einstein's Theory of Relativity (which see), space is regarded as being curved, instead of extending indefinitely outward.

J.W.Y.

CURVILINEAR, *kur vi lin' e ahr*. See PLANE; ANGLE.

CURWOOD, JAMES OLIVER (1878-1927), one of the foremost writers of fiction in the first quarter of the century, who produced realistic stories based on life in Canada in



Photo. Brown Bros.

GLENN CURTISS

earlier days. He showed such familiarity with Canadian backgrounds that most readers believed him to be a native of the Dominion, but he was born in Owosso, Michigan, and made his home there all his life.

Curwood began his literary career on the daily *News-Tribune* of Detroit, where he remained seven years. Descended from a famous writer, Captain Marryat, and possessed

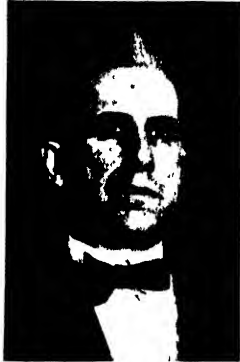


Photo U & U

JAMES OLIVER CURWOOD

the field of fiction promised good returns, so in 1907 he began to devote his time exclusively to this work. His first two stories of Canada attracted the attention of the Canadian government, and he was engaged by the Dominion as an "explanatory and descriptive writer"; he spent many months during the next few years traveling in the wilds of the Northwest, and became probably the most expert authority on life in the northland. Several of his tales have been adapted for presentation as moving pictures.

A Prolific Writer. Curwood's first book was *The Courage of Captain Plum*, published in 1908. In rapid succession followed *The Wolf Hunters* (1908), *The Great Lakes* (1909), *The Gold Hunters* (1909), *The Danger Trail* (1910), *The Honor of the Big Snows* (1911), *Phillip Steele of the Royal Mounted* (1911), *Flower of the North* (1912), *Isobel* (1913), *Kazan* (1914), *God's Country and the Woman* (1915), *The Hunted Woman* (1916), *The Grizzly King* (1917), *Baree, Son of Kazan* (1917), *The Courage of Marge O'Doone* (1918), *Nomads of the North* (1919), *The River's End* (1919), *The Valley of Silent Men* (1920), *The Flaming Forest* (1921), *The Country Beyond* (1922), *The Alaskan* (1923), *The Ancient Highway* (1924), and *The Black Hunter* (1926).

CURZON, *kur' zon*, GEORGE NATHANIEL, Lord (1859-1925), best known in the latter years of his life as MARQUIS CURZON OF KEDLESTON, an English statesman, who in almost every detail of his mature life exemplified the type of personality known as the ruling aristocrat. He was nearly the last Englishman of the old school who held to the belief that rule should repose in the hands of the titled few. He was educated at Eton and Oxford, and later became private secretary to Lord Salisbury. He was elected to Parliament as member for Southport, Lancashire, and held his seat for twelve years. In 1895 he married Mary Victoria Leiter, daughter of a wealthy Chicago merchant. In 1899 he was appointed Viceroy of India, a position he

retained until 1905; in that post he did much to consolidate Britain's Indian empire. Upon returning from India, he was created a peer. He desired to become Premier of Great Britain, but the day had passed when a Lord could be named for that high post. In 1916, his wife having died in 1906, he married again. In 1919 he assumed a post in the Lloyd George Cabinet, and became Minister of Foreign Affairs under A. Bonar Law, in October, 1922.

In Literature. Curzon wrote the following books, which are considered authoritative: *Persia and the Persian Question*, *Russia in Central Asia*, and *Problems of the Far East*.



Photo: U & U

LORD CURZON

CUSHMAN, CHARLOTTE SAUNDERS (1816-1876), one of the greatest tragic actresses of America, the first member of the theatrical profession whose name has been placed in the Hall of Fame (which see). This honor was accorded her in 1915. She was born in Boston. Possessing a fine contralto voice, she began when a young girl to study for the operatic stage, but after straining her voice in singing high rôles, she devoted herself to drama. Although she occasionally played in high comedy, Miss Cushman was best known as a tragedienne. She had immediate success in both London and Dublin, and remained abroad for several years. The latter part of her life she spent in America, and on her last stage appearance, in New York City, November, 1874, she was presented with a laurel crown, William Cullen Bryant acting as spokesman.



Photo: Brown Bros.

CHARLOTTE CUSHMAN

[*Lady Macbeth* was one of her greatest rôles, and she was much praised for her interpretation of the part of Meg Merrilies, in Scott's *Guy Mannering*.]

CUSPIDS. See **TEETH**.

CUSTER, GEORGE ARMSTRONG (1839-1876), one of the bravest of American soldiers, whose story is one of wild life on the plains and of bloody Indian warfare. He was born at New

Rumley, Ohio. After being graduated from West Point, at the outbreak of the War of Secession he was given a commission in a cavalry regiment and took part in the first Battle of Bull Run. He was appointed aide-camp to General McClellan, who was impressed by Custer's energy and bravery. The first colors captured by the Union army were taken by Captain Custer. By 1863 he had gained the rank of major, and later became major general of volunteers.



Photo. Brown Bros.

GEORGE A. CUSTER

From 1866 to the time of his death, he was known as *Yellow Hair*, a fighter of Indians on the plains of Montana and Dakota. His last battle was fought in June, 1876, when he and his whole command were defeated and massacred on the Little Big Horn, by the Sioux under Sitting Bull. The spot has been made a national cemetery, and places in Montana and in the Black Hills of South Dakota, as well as in a number of other states, are named for him. In Longfellow's poem, *The Revenge of Rain-in-the-Face*, the story of Custer's last battle is told. He was buried at West Point, where a statue was erected in his honor. See **SITTING BULL**.

Battle of Little Big Horn, the scene of "Custer's last stand," was an attempt to end the hostile careers of Sitting Bull, Crazy Horse, and Rain-in-the-Face, Indian leaders who had been more than a match for



Photo. U & U

LITTLE BIG HORN BATTLE FIELD
Its appearance at the present time

a considerable force of soldiers under General Crook. The latter sent Custer with 208 men to the Big Horn River to engage an Indian detachment; on the Little Big Horn he was attacked by a superior force, and the entire command was killed. The engagement lasted no more than twenty minutes.

CUSTIS, GEORGE WASHINGTON PARKE (1781-1857), the adopted son of George Washington and grandson of Martha Washington, and an author of several plays. It was he who erected the mansion on the site of the present Arlington National Cemetery (which see), once the home of Robert E. Lee through the latter's marriage with the daughter of Custis.

[Custis is best known for his publication of *Recollections of Washington*.]

CUSTOMS DUTIES, a system of taxation most commonly referred to as a tariff. Since first known, plans under which duties have been levied have undergone many modifications.

[The origin of the peculiar term *customs duties* is traced back in English history to the time when the English kings disputed with the Commons as to the right of the sovereign or the lawmakers to impose taxes. The king claimed it as his continuous prerogative, because of ancient *customs* long undisputed. Some authorities attribute its origin to the *customs* of European cities in an older day to levy taxes upon goods brought from other cities, even if they were located in the same country.]

Duties in the present day are levied principally on goods entering one country from another. These are known as *import duties*. In a few countries, duties have to be paid upon commodities shipped abroad, in which case the term *export duties* is applied; for example, Brazil taxes every pound of coffee exported from that country. Neither Canada nor the United States can lay export duties. Usually, the only reason any nation can have for levying duties on exports is to restrain its citizens from sending out of the country commodities sorely needed at home, but Brazil adopted its export duty on coffee to be certain of an unfailing source of public revenue.

Not all countries have the same reason for maintaining customs duties. England, called a *free trade* country, taxes only such imports as liquors, tobacco, tea, and sugar, and does it solely to gain revenue. Canada and the United States, on the other hand, provide duties on all sorts of manufactured goods and farm products, so that their own producers will have an advantage over foreign merchants. This is called a *protective tariff* system.

If customs charges are based on the *quantity* of imports, the duties are said to be *specific*, or *special*; if according to the *value* of imports, they are described by the Latin phrase *ad valorem*, meaning *according to value*. Sometimes imports are charged with a combination of *ad valorem* and specific rates. E.D.F.

Related Subjects. The story of duties and their collection is enlarged in the article **TARIFF**, in these volumes. See, also, **FREE TRADE**; **PROTECTION**.

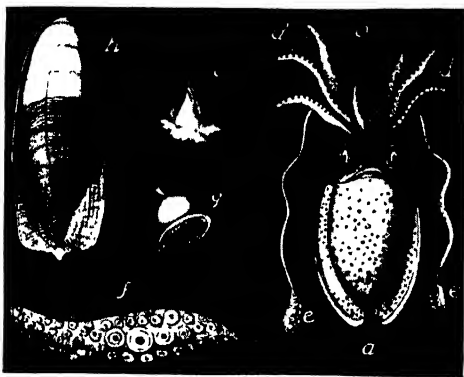
CUSTOMS UNION. See **ZOLLVEREIN**.
CUTCH. See **CATECHU**.

CUTICLE. See SKIN.

CUTTER, a vessel. See YACHT AND YACHT-ING.

CUTTLEFISH, *cut'ʹl fish*, a mollusk whose internal shell is the broad, spongy, chalky cuttlebone, used by cage birds to sharpen their beaks. It is also ground to make tooth powder. The cuttlefish is important, too, for the production of the pigment sepia (which see), an inky substance which it expels when alarmed, to darken the water and make possible its escape.

Cuttlefish are found in all seas, usually in deep water, but occasionally near shore. They are commonly about nine inches long, but some



CUTTLEFISH

(a) General view; (b) location of mouth; (c) mouth; (d) arms, with suckers, (e) tentacle with suckers on end; (f) end of tentacle, showing suckers, (e) one of the suckers, (h) interior shell, called *cuttlebone*.

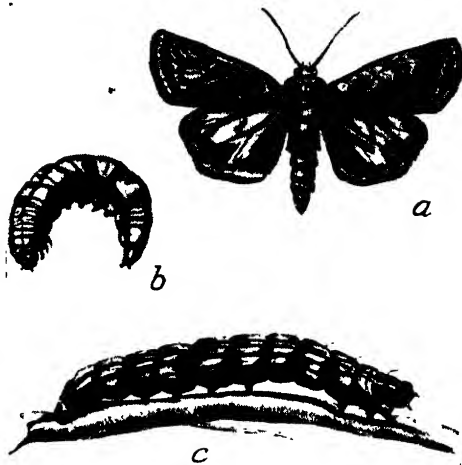
are as long as seven feet. Their bodies are brown, cross-banded, and spotted with purple, showing brilliantly metallic in sunlight, or changing color at will. Eight short arms and two long tentacles, all bearing four rows of horny-rimmed suckers, surround the mouth. The tentacles can be drawn into pockets behind the eyes. The arms are used to catch shellfish food, or to attach the animal to various objects. In the broad head are two large eyes. A frilled fin edges the oval body. By drawing in or forcing out jets of water from the mantle cavity through a funnel, cuttlefish are enabled to move backward or forward. They are grouped with the nautilus, octopus, and squid (all of which see) to form the class of mollusks called *Cephalopoda* (see CEPHALOPODA; MOLLUSKS).

S.H.S.

Scientific Name. Cuttlefish belong to the family *Sepiidae*. The common species is *Sepia officinalis*.

CUTWORM, the common name for numerous large, plump caterpillars that feed voraciously on orchard, garden, and field plants. They are the larvae of numerous species of night-flying moths. Cutworms have a smooth, greasy skin, and vary in color from light or

dark gray to nearly black; some are striped or spotted. They cut off young plants at the level of the ground, destroying more than they eat. Little armies of cutworms have been known



CUTWORM

(a, b) Moth and larva of one common species, (c) larva of another species. About actual size

to destroy entire fields of young wheat, corn, or garden vegetables overnight, as they feed chiefly after dark. They also attack tobacco, cotton, and leaves and buds of fruit trees. Treatment with poison sprays is effective in destroying these pests. An excellent preventive consists in sprinkling the ground with poisoned bran mash before the plants come above the ground, for cutworms will eat a mixture of Paris green, bran, and sugar-sweetened water in preference to vegetation. If they do succeed in getting into the growing plants, the bran mash should be spread over the infested garden or field.

W.J.S.

Scientific Names. Cutworms are the larvae of various moths belonging to the family *Noctuidae*. The common garden cutworm is the larva of *Agrotis ypsilon*.

CUVIER, *ku vya'*, GEORGES LÉOPOLD CHRÉTIEN FRÉDÉRIC DAGOBERT, Baron (1769-1832), one of the greatest naturalists the world has produced, was born at Montbéliard, France. After graduation at Stuttgart, he accepted a situation as tutor in Normandy. Several



Photo Brown Bros

CUVIER

theses on zoölogical topics established his reputation and procured him admission to the learned societies of Paris. In 1802 he succeeded to the chair of comparative anatomy at the Jardin des Plantes (botanical and zoölogical garden), and devoted himself to the studies which have perpetuated his name. His great book on the animal kingdom (*Le Règne Animal*) was for a long time the highest authority on zoölogy; this and many other works raised him to the pinnacle of scientific fame. Cuvier filled many offices of importance, particularly those connected with educational institutions. Napoleon treated him with much consideration, and Louis Philippe raised him to the rank of a peer of the realm.

CUYAHOGA, *ki a ho' gah*, RIVER. See CLEVELAND (Ohio).

CUZCO, *koos' ko*. See PERU (The Cities)

CYANIDE, *si' a nide*. See CYANOGEN.

CYANITE, *si' a nite*, a variant of kyanite (which see).

CYANOGEN, *si an' o jen*, a colorless gas formed by the union of carbon and nitrogen. It has the odor of peach pits, and burns with a purplish flame. It is valuable only for its compounds. A compound of cyanogen with a metallic element is called a *cyanide*. When a cyanide is heated with sulphuric acid, the deadly poison *prussic acid* is formed. *Potassium cyanide*, the most important compound, is used in large quantities in the "cyanide process" of extracting gold from its ores. See GOLD

T.B.J.

Chemical Formula. The formula for cyanogen is C_2N_2 ; that is, a molecule contains two atoms of carbon and two of nitrogen.

CYAXARES, *si ak' sah recz*. See BABYLONIA.

CYBELE, *sib' e le*. See RHEA (mythology).

CYCADS, *si' kadz*, large tropical and subtropical naked-seeded plants (gymnosperms) of palm- or fernlike appearance and habits. As they bear cones, however, they are more nearly related to pines than to the palms. Fossil remains show that such plants, with their columnlike stems topped with rosettes of feathery, fernlike leaves and huge cones, were once very abundant everywhere, but they are found only in small areas at present. One species, however, is still almost as thick as weeds in Southern Florida. The stems of some cycads are like large tubers, almost or entirely underground. Cycad stems store immense quantities of starch, for which they are collected in some countries for the production of *sago* (which see). That has caused the tree to be incorrectly called *sago palm*, but the sago of commerce is obtained from a true palm.

G.M.S.

Classification. The cycads constitute nine genera composing the family *Cycadaceae*. Only the genus *Zamia* occurs in the United States

CYCLADES, *sik' la deez*, a group of islands in the Aegean Sea, southeast of Greece, to which country they belong. The principal islands are Andros, Paros, Naxos, Rhenea, Syra, and Delos, the latter particularly famous in ancient myths and story. The soil is naturally fertile, but lack of water is a serious handicap to agriculture. Fishing is the principal occupation of the inhabitants, though olives and grapes are grown in considerable quantities. The chief source of revenue lies in valuable deposits of building stone, which is extensively quarried. The commercial center is Hermopolis, a town with a good harbor, on the island of Syra. Population, slightly over 122,000.

[The name *cyclades* is derived from the Greek *kyklos*, meaning a circle, and was given to the islands because they were supposed to form a protecting circle around the sacred island of Delos.]

Delos, the central and smallest of the group, was held in deep veneration by the ancient Greeks as a sacred island, the birthplace of Apollo. They believed it once to have been a floating island, but that it was anchored in its present location by Poseidon (Neptune of the Romans) to afford a refuge for Leto, the mother of Apollo.

CYCLAMEN, *sik' la men*, the name of a genus of handsome, winter-blooming, tuberous-rooted plants of the primrose family, mostly



CYCLAMEN

natives of the Mediterranean region of Europe and Asia, but cultivated in homes and greenhouses in America. The flowers are scentless, with white, rose-colored, or purple petals turned backward, as if the flowers had been turned inside out. The latter are from two to two and

a half inches long and droop downward on their stems. The leaves are large, heart-shaped, glossy, and of varying tints. Although usually purchased in pots already flowering, with a little care the cyclamen can be raised from seed in a light, rich soil. While the seeds are germinating, a temperature of 50° to 60° F. and plenty of water are required.

In Southern Europe, the turniplike, bitter, partly underground stems of the cyclamen are relished by swine. B.M.D.

Scientific Names. The cyclamens belong to the family *Primulaceae*. The species commonly cultivated are *Cyclamen europaeum* and *C. latifolium*.

CYCLE. See DYNAMO (Alternators).

CYCLOMETER, *si klom' e tur*. See SPEEDOMETER.

CYCLONE, *si' klohn*, a term applied to a form of atmospheric disturbance whose distinguishing characteristics are relatively low pressure and a system of spiral inflowing winds.

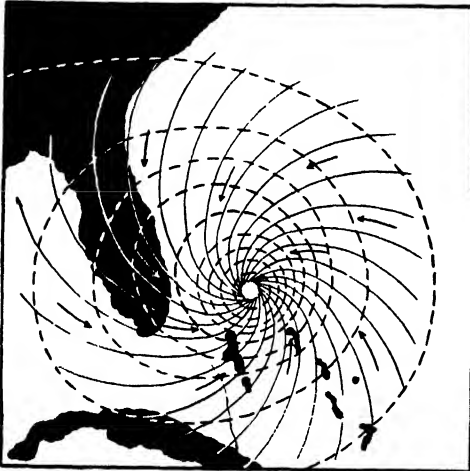


DIAGRAM OF FIELD OF ACTION

The solid, converging lines indicate motion of the wind; the dotted lines, the general path of the storm. Many cyclonic storms have their origin in the West Indies; some which start farther to the east have a devastating effect upon Southeastern United States.

An *anticyclone*, as its name indicates, is the opposite of the cyclone, it being a condition of high pressure, with spiral outflowing winds. The spiral nature of the wind systems is a consequence of the deflective force of the earth's rotation, the deflection being to the right in the northern hemisphere and to the left in the southern hemisphere.

Three distinct types of cyclones may be classified:

(1) The permanent or semi-permanent low-pressure areas, known as "centers of action." These are constant phenomena for certain latitudes of the earth (as, for example, at the

equator), and seasonally permanent over the continents and oceans of the high latitudes. The semi-permanent type may be illustrated by the Aleutian Low over the North Pacific Ocean in winter, and the Asiatic Low, over that continent in summer.

(2) Moving cyclones of the low latitudes, known as tropical cyclones. These are, at least partly, convectional in origin. They originate over the sea, usually on the western sides of oceans, at the equatorial margins of the trade-wind belts. These storms are relatively intense and frequently destructive.

(3) Moving cyclones of the middle and higher latitudes, known as extra-tropical cyclones. Normally, these are mild storms, accompanied by clouds and frequently rain, and are not to be confused with tornadoes. They move from west to east, as they are carried along by the general drift of the westerly winds. They are analogous, therefore, to shallow whirlpools or eddies carried downstream by the general current. The origin of cyclonic storms in the intermediate zones is not entirely clear, but it seems fairly certain that they are the result of conflicting air currents of contrasting temperature, humidity, and density characteristics. Thus, air on the poleward side of the cyclone is cooler and normally drier than that to the south of the storm center.

Conditions in cyclones are usually favorable for the development of clouds and precipitation; for as air currents contrasting in temperature and density come into conflict within the storm, the less dense masses of air are forced to ascend, with consequent cooling and probable condensation.

Extra-tropical cyclones are more numerous and better developed in winter than in summer, and it is the constant succession of these storms, together with the intervening anticyclones, which gives the intermediate zones their variable winter weather. G.T.T.

Related Subjects. The following articles in these volumes will make more clear the general principle of a cyclonic disturbance and the distinction between various types

Barometer	Tornado
Hurricane	Typhoon
Storms	Whirlwind
See, also, WIND, and the topics listed there	

CYCLOPES, *si klo' peez*, in Grecian legend, a race of giant shepherds. Each had only one eye, which was placed in the middle of the forehead. These giants dwelt in Sicily. In the story of Hesiod, they were the sons of Uranus and Gaea, or Heaven and Earth, and were slain by Apollo for having furnished Zeus with thunderbolts to kill Asclepius. See MYTHOLOGY; POLYPHEMUS.

CYCLOSTOMATA, *si klo'sto' ma tah*. See ZOÖLOGY (Divisions of the Animal World).

CYGNET, *sig' net*, a young swan. See SWAN

CYLINDER. A circular solid having the same diameter throughout its length, and having as its ends two equal parallel circles, is called a *cylinder*. These circles are called the *bases* of the cylinder; the distance between the bases is the *altitude* (*a-a*) of the cylinder; the curving surface is called its *lateral*, or *convex*, surface (Fig. 1).

We see this figure in water pipes, gas pipes, logs, iron rods, tin vegetable cans, water tanks, and so forth.

From a rectangular piece of tin or paper six inches long and four inches wide, you can make a cylinder six inches in circumference and four inches high, allowing no material for a lap (Fig. 2). From this it is seen that the lateral surface of a cylinder is equal in area to a rectangle whose length is equal to the circumference of the cylinder and whose width is equal to the altitude of the cylinder.

Therefore we have this law: *Area of lateral surface of a cylinder is the product of the circumference and the altitude when these two dimensions are expressed in the same linear units.* For example: Find the lateral surface of a water pipe whose circumference is 30

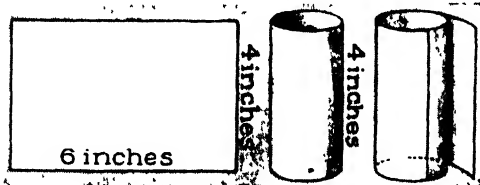


FIG. 2

Showing the relation between the area of the lateral surface and that of a rectangle of similar dimensions.

inches, and whose length is 20 feet. Solution: lateral surface in square feet = $20 \times 2\frac{1}{2} = 50$, or lateral surface in square inches = $240 \times 30 = 7200$.

If we know the diameter or radius, and the altitude of a cylinder, to find its lateral surface, we first find the circumference and proceed as before. Circumference equals $3.1416 \times \text{diameter}$, or $2 \times 3.1416 \times \text{radius}$ (see CIRCLE). For example: Find how many square inches of tin in the lateral surface of a can 3 inches in

radius and 10 inches high. The solution follows:

Circumference of a circle = $2 \times 3.1416 \times \text{radius}$.

Circumference of can in inches = $2 \times 3.1416 \times 3 = 18.8496$.

Lateral surface in sq. in. = $10 \times 18.8496 = 188.496$.

How many square inches of tin will be required for the entire can? The bases are circles; therefore the area of each base equals $3.1416 \times \text{radius}^2$ (see CIRCLE).

Area of 2 bases in sq. in. = $(3.1416 \times 3^2) \times 2 = 56.5488$

Lateral surface in sq. in. = 188.496.

Entire surface in sq. in. = 245.0448 (sum of 56.5488 and 188.496)

The volume of a cylinder equals the product of the area of one base and the altitude; expressed more concisely:

Volume of cylinder = $3.1416 \times \text{radius}^2 \times \text{altitude}$.

The number of cubic inches in the above can is found as follows:

Radius = 3 in.

Altitude = 10 in

Volume in cu. in. = $3.1416 \times 3^2 \times 10 = 282.744$.

Practical Problems. A well is 30 feet deep and 4 feet in diameter. How many gallons of water will it hold?

We see that the well is a cylinder. The base is a circle whose radius is 2 feet, and the depth of well, 30 feet, is the altitude of the cylinder. The solution is as follows:

Area of base in sq. ft. = $3.1416 \times 2^2 = 12.5664$.

Volume in cu. ft. = $12.5664 \times 30 = 376.992$.

1 cu ft = 1728 cu in.

376.992 cu ft. = $376.992 \times 1728 \text{ cu in} = 651442.176 \text{ cu in}$.

231 cu in. = 1 gallon

Number gal in well = $651442.176 \div 231 = 2820.096$

The solution may be shortened as below by cancellation:

Radius = 2 ft

Area of base in sq ft = $3.1416 \times 2^2 = 12.5664$.

Volume in cu. ft = $12.5664 \times 30 = 376.992$.

231 cu in. = 1 gallon.

1728 cu. in. = 1 ft.

$$\begin{array}{r} 4.896 \\ 34.272 \quad 576 \\ \hline \text{Number gallons in well} = \frac{376.992 \times 1728}{231} = 2820.096 \\ \hline 231 \\ 77 \\ 7 \end{array}$$

How many square inches are there in the lateral surface of a lead pencil which is one-fourth inch in diameter and six inches long?

Take a piece of paper $11\frac{1}{4}$ inches wide and 20 inches long. Roll it to form a cylinder, using the $\frac{1}{4}$ inch from $11\frac{1}{4}$ inches to paste as a lap. What is the circumference of the cylinder? Find its diameter and radius.

The circumference = $3.1416 \times \text{diameter}$. Therefore, $11 = 3.1416 \times \text{diameter}$. (For many practical problems we may use $3\frac{1}{2}$ instead of 3.1416 .) Do so here and see that $11 = 3\frac{1}{2} \times \text{diameter}$; diameter

$$= 11 \div 3\frac{1}{2} = \frac{11}{\frac{7}{2}} = \frac{11}{7} \times \frac{2}{1} = \frac{22}{7} = 3\frac{1}{2}; \text{ radius} = \frac{1}{2} \text{ of } 3\frac{1}{2} = 1\frac{3}{4}.$$

Find the area of the ends of your cylinder. Solution is as follows:

Area of a circle = $3\frac{1}{2} \times \text{radius}^2$.

Area of 2 bases = $3\frac{1}{2} \times (1\frac{3}{4})^2 \times 2 =$

$$\frac{11}{2} \times \frac{49}{4} \times 2 = \frac{11}{2} \times \frac{49}{2} = \frac{539}{2} = 109\frac{1}{2}.$$

Area of bases = $109\frac{1}{2}$ sq. in.

Second solution: We may use the fact that

$$\text{Area} = \frac{\text{radius}}{2} \times \text{circumference}.$$

$$\text{Area of 1 base} = \frac{1\frac{3}{4}}{2} \times 11 = \frac{7}{4} \times \frac{11}{2} = 9\frac{5}{8}$$

$$\text{Area of 2 bases} = 2 \times 9\frac{5}{8} = 19\frac{1}{4}$$

$$\text{Area of bases} = 19\frac{1}{4} \text{ sq. in.}$$

How many cubic feet of water can be stored in a cylindrical reservoir 40 feet in radius and 60 feet high?

The volume of the cylinder is a problem which enters largely into the industrial world; for example, in the building of reservoirs, pipes, and tanks for transporting oils, and in the construction of engines and machines of various kinds, a knowledge of the capacity of the cylinder is essential. J.W.Y.

CYMBELINE, *sim' be lin*. See SHAKE-SPEARE (Synopsis of the Plays).

CYME, *simc*. See INFLORESCENCE.

CYMRIC, *kim' rik*. See CELTS.

CYNIC SCHOOL OF PHILOSOPHY, a system of Greek philosophy founded in the fourth century B.C. by Antisthenes, a disciple of Socrates. He took as his starting point the doctrine of his great teacher, that virtue and not pleasure is the chief end of life, and it alone constitutes true happiness. From this he argued that, since continued happiness is not possible if man has wants and desires which may not be satisfied, the wise man is the one who looks with contempt on all the ordinary pleasures of life and who lives without regard for riches or honors, unfettered by obligations to society, state, or family, because these things give rise to desires that cannot be satisfied.

Among the enthusiastic followers of Antisthenes was Diogenes (which see), who carried the principles of the school to an extreme, living, it is said, on the coarsest bread and sleeping at night in a tub. Zeno, of the later Roman period, was another distinguished Cynic. Though not of the greatest importance as a

school of philosophers, the Cynics form the link between Socrates and the more influential Stoics (see ZENO; STOICISM).

Derivation and Modern Application. Authorities differ as to the derivation of the name *cynic*, some referring it to Cynosarges, the name of the building in Athens in which the Cynics first met, and some to the Greek word for *dog*, alluding to the rude manners of the members of the school. In modern usage, the word *cynic* implies a sneering tendency to deny that goodness exists in human nature.

CYNOSCEPHALAE, *sin os sef' a le*. See THESSALY.

CYNOSURE, *si' no shoor*. See NORTH STAR.

CYPRESS, *si' pres*. This is the common name of a genus of cone-bearing evergreen trees and shrubs of the pine family, native to North America, Europe, and Asia. They have dark, scalelike leaves, placed on the



CYPRESS

Branch, leaves, and cones

twigs in a comblike arrangement, and rounded cones, on which a few woody scales develop. There are about fifteen species of cypress, and most of them are serviceable for landscape effects. Some species have wood of considerable commercial value.

One of the best-known species is the *common cypress* of Southern Europe, now grown in England and America as an ornamental tree. It is famous for the great age it attains and the durability of its wood. The tree assumes a tapering, flamelike shape, and with its thick masses of dark-green leaves is an impressive plant. In Italy, especially, it is much used in cemeteries. Because the cypress never grows again, once cut down, it was anciently regarded as an emblem of the dead. Its red or yellowish wood has been much used for musical instruments and other objects for which long preservation is desired.

Notable among American cypresses is the beautiful *Monterey cypress*, found only on the Monterey Peninsula of California. The cypress trees there are among the remnants of a great forest of cone-bearers that in prehistoric times extended twenty to forty miles outward from the California coast. The so called *yellow*

cedar and Port Orford cedar, found on the Pacific coast, belong to a closely related genus.

The Bald Cypress. This well-known and valuable tree of Southern swamps belongs to the same family, but not to the same genus, as the cypresses named above. It differs from them in shedding its leaves in winter (see DECIDUOUS TREES) and in being able to live with its roots under water. In the swamps of the Southern United States, the tree reaches a height of 150 feet or more, and attains a trunk diameter of ten or fifteen feet. When the bald cypress grows in loose, wet soil or with its base in water, the roots develop knoblike projections called *knees*. These are supposed to supply the roots with air, though they may serve to anchor them in muddy soil. The heartwood of the tree is so easily worked and so resistant

to decay that it is widely used in the construction of watering troughs, silos, fence posts, telephone poles, gates, greenhouses, and the like. Louisiana and Florida are the leading cypress-lumber states. GMS

Scientific Names. The cypresses belong to the family *Pinaceae*. The common cypress of Europe is *Cupressus sempervirens*, the Monterey cypress, *C. macrocarpa*, the yellow cedar, *Chamaecyparis nootkatensis*; the Port Orford cedar, *Chamaecyparis lawsoniana*. The bald cypress is *Taxodium distichum*.

CYPRUS, *si' prus*, after Sicily and Sardinia, the largest island in the Mediterranean Sea. It occupies 3,584 square miles in the northeast corner, forty miles from the coast of Asia Minor, and is nearly three times the size of Rhode Island. Mountain ranges border its north and south coasts, rising at one point to a height of nearly 6,500 feet, and between them lies a plain now bare and little cultivated, but once covered with forests which supplied timber for the Greek, Persian, and Egyptian fleets.

Agriculture is the occupation of most of the people. Wheat, barley, oats, and grapes are raised, all in somewhat primitive fashion, but the government is educating the people in modern methods, building irrigation works and replanting the forests. Strabo, Pliny, and other ancient geographers tell of great mineral wealth, and our word *copper* once meant *metal from Cyprus*, for which the Greek name was *Kypros*. To-day no metals are produced, but the island is one of the world's few sources of asbestos, gypsum, and umber.

Like all lands of the Eastern Mediterranean, Cyprus has a story with many chapters. Egypt conquered its Greek and Phoenician colonists 3,500 years ago, then Assyria, and still later, Persia. It formed part of the empires of Alexander and the Ptolemies, of Rome, Byzantium, and Baghdad. During the Crusades (which see), it fell to Richard the Lion-Hearted,

and for three centuries was a feudal kingdom. After a brief Venetian rule, the Turks governed for another 300 years. From 1878, England administered the island for Turkey, but annexed it in 1914, soon after the beginning of the World War. Of the 310,000 people, four-fifths are Christians, of an independent Church founded by Barnabas, who is mentioned in the

Acts as "of the country of Cyprus."

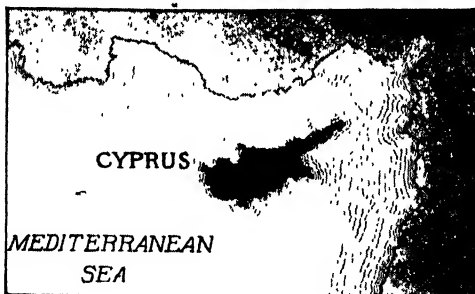
CYRENAICA, *seer e-na' i kuh*. See LIBIA.

CYRENE, *si re' ne*, an ancient city of Africa. See AFRICA (History).

CYRNOS, *sir' nohs*, the ancient name of Corsica (which see).

CYRUS, *si' rus*, called THE GREAT, OF THE ELDER (about 600-529 B.C.), conqueror of

Babylon and founder of the later powerful Persian Empire. According to recently discovered cuneiform inscriptions now in the British Museum, he was the son of Cambyses and Mandane, a daughter of the Median king Astyages. Legends state that Astyages feared overthrow at the hands of his grandson, Cyrus,



LOCATION MAP



TOMB OF CYRUS

Cyrus had placed upon his tomb these words: "Oh, man! whosoever thou art, and whencesoever thou comest (for come I know thou wilt), I am Cyrus, the founder of the Persian Empire, envy me not the little earth that covers my body." Alexander the Great visited the tomb, and was much affected by the inscription, which placed before him the uncertainty and vicissitude of earthly things. The tomb was broken open, and Alexander caused the author of the sacrilege to be put to death. The location is 550 miles east of old Babylon.

and endeavored to have him killed when an infant. Cyrus was protected by a shepherd and was eventually restored to his parents.

Whether previously prophesied or not, the fact remains that Cyrus began his remarkable career by collecting a vast army of Persians, with which he overthrew his grandfather and became king of Media and Persia. He next made himself master of Lydia, by defeating Croesus. At that time, Nabonidus, king of Babylon, was unpopular with his subjects, and Cyrus considered the time favorable for an attack upon that empire. The city fell almost without a struggle before the victorious hosts of Cyrus, who declared himself king. He proved a wise, generous ruler, and permitted the Jews to return to Jerusalem from captivity. His ambition and desire to increase his already vast domains led to his downfall. While conducting an expedition against the Scythians, north of his kingdom, he was slain in a battle against the forces of the Scythian queen Tomyris. His body was buried at Pasargadae, where his tomb, now silent and empty, still stands alongside a broken monolith that once bore witness to his greatness. See PERSIA (History).

CYRUS (? -401 B.C.), THE YOUNGER, so called to distinguish him from Cyrus the Great (which see), founder of the Medo-Persian Empire. He was a son of Darius II and brother of Artaxerxes, who became king of Persia in 404 B.C. Bitterly jealous of his brother's power, Cyrus conspired against him. His plots were discovered, and he was condemned to death, but was spared by Artaxerxes in answer to his mother's entreaty. While acting as *satrap*, or governor, of Asia Minor, he collected an army of 100,000 men, 13,000 of whom were Greek auxiliaries noted for their bravery. He marched eastward, intending to overthrow his brother and seize the throne. Artaxerxes gathered an army and met him on the plains of Cunaxa (401 B.C.). In the fight, Cyrus was slain and his army routed, with the exception of the Greeks, who not only held their own but broke their way through all opposed to them. The retreat of the Greek soldiers and their great sufferings are immortalized by Xenophon in the *Anabasis* (which see).

CYSTIC, *sis' tik*, DUCT. See GALL BLADDER.

CYTISINE, *sit' i sin*. See LABURNUM.

CYTOLOGY, the science of cell organism. See the article CELL.

CYTOPLASM, *si' toh plaz'm*. See PROTOPLASM; CELL.

CZAR, *zahr*, a corruption of the Roman word *Caesar*, was the title of the emperor of Russia, and was first adopted in 1547 by Ivan the Terrible. The Russian empress was styled the *czarina*, and the heir apparent was called the *czarevitch*. The same title is seen, in a different form, in the word *kaiser*, applied to the former emperor of Germany, and last held by William II. The last czar was Nicholas II (which see).

CZAREVITCH, *zahr' e vich*. See CZAR.

CZECH, *check*, a Slavic race which became the most important element in the new Czechoslovakia. Their total number is at present about 10,000,000. At one time, all the Slavic peoples had one common tongue; the Czechs, however, have gradually evolved a separate language, which has absorbed many German words, but still bears a resemblance to old Slavic. The spoken language is considered very musical and has a wide variety of sounds. Three centuries ago, the Czechs were a prosperous nation, but they fell under the power of Austria and their nationality was lost. At the outbreak of the World War in 1914, the Czechs, occupying Bohemia, Moravia, Silesia, and a part of Hungary, were placed in the curious position of being forced to fight for a country from which they had long been endeavoring to free themselves; their sympathies were largely Russian, but they were politically Hungarians. The prosperity they attained may be said to have been in spite of the Austro-Hungarian government, rather than with its assistance. In 1919 they were again a nation, recognized by the powers. See CZECHOSLOVAKIA, below.

CZECHOSLOVAKIA, *chek' o slo va' ki ah*, or the CZECHOSLOVAK REPUBLIC, the most important state of those which were built upon the



LOCATION MAP

ruins of the defeated and disintegrated Austro-Hungarian monarchy at the close of the World War. This republic, which is 54,206 square miles in area—about the size of the state of Illinois—is bounded on the north by Germany and Poland, on the south by Austria, Hungary, and Rumania, and includes Bohemia, Moravia, a part of Silesia, the Slovak territory of former Hungary, and the territory of Carpathian Ruthenia. In June, 1918, it was fully organized, with Professor Thomas Masaryk as its first President. This organization occurred in Paris, and the allied powers gave it prompt recognition.

The People. Czechoslovakia contains a mixture of many nationalities; sixty-five per cent of the population are Czechs and Slovaks, twenty-three per cent are German, five per cent are Magyars, and the remainder are Ruthenians, Jews, and Poles. The entire population was reported in 1928 as a little more than 14,388,000. As a whole, the people of Czechoslovakia are a sturdy agricultural people. The percentage of illiteracy is very low, except in certain districts of Slovakia. The Czech and Slovakian languages, which are nearly identical, are the chief languages spoken; however, German is generally understood throughout the country.

Principal Cities. Prague, the old capital of Bohemia and the new capital of Czechoslovakia, is the largest and most important city. A detailed discussion of this city will be found in a separate article, in its alphabetical order. Carlsbad, famous as a health resort, is also discussed in a separate article. Descriptions of other important cities follow:

Brünn, BRNO on European maps, is the capital of the province of Moravia. It is a beautiful city, at the junction of the rivers Schwarzwawa and Zvitawa, eighty-nine miles north of Vienna. The name is derived from the Hungarian word *bruno*, meaning *mud* or *clay*, conferred on account of the nature of the soil on which it stands. The city is noted for its manufacture of woolen goods, which years ago earned for it the name of the "Austrian Leeds," the English city of Leeds being then the world's greatest wool-manufacturing center. There are also manufactures of leather, cotton, silk, chemicals, hardware, and machinery. Its extensive commerce is chiefly promoted by fairs, which attract merchants from all parts of Europe. Until 1860 the town was surrounded by fortifications, but the ramparts were then converted into beautiful promenades. The Masaryk University, which was organized in 1919 and patterned after the Czech University at Prague, gives instruction in law, medicine, natural science, and philosophy. Population, 1926, 232,228.

Pilsen, a city in Bohemia, noted for its famous Pilsener beer. The municipal brewery occupies one quarter of the city, and its cellars extend for miles. Pilsen is about sixty-eight miles southwest of Prague, and ranks next to that city in size among the cities of Bohemia. It is well built, and has beautiful promenades and several notable structures. The Church of Saint Bartholomew, with its spire 335 feet high, dates back to the thirteenth century; the Renaissance town hall contains the hall in which Wallenstein received from his generals the oath of fidelity. The first printing press in Bohemia was set up in Pilsen. In addition to the breweries, there are glass works, copper works, bell foundries, and manufactures of paper, pottery, leather, wire, and vehicles. Population, 1926, 110,675.

Pressburg, pres'bourK, or BRATISLAVA, on European maps, the former coronation town of Hungary, is situated thirty-five miles east of Vienna. It has a picturesque location on the north bank of the Danube River, in the region of the Carpathian Mountains. Historically, Pressburg is interesting for an important treaty which was concluded in 1805 by Emperor Francis and Napoleon. Points of interest are the

Landhaus, where formerly the Hungarian Diet held its sessions; the medieval town hall, with a museum of Roman antiquities, and a handsome equestrian statue of Maria Theresa. Modern Pressburg, with its many interesting churches, palaces, and historic buildings, and its spacious boulevards, has become one of the most progressive cities of the new republic. It maintains the Slovak Komenskolo University, and it was formerly the seat of the commission, now in Vienna, which governs navigation on the Danube. Its industries include an oil refinery and manufactories of cloth, leather, machinery, and chemicals. It is rapidly developing into an important distributing center for Balkan trade. Since 1924, improvements have been conducted to increase the capacity of the port. New quays and railways have been constructed, and its warehouses have been improved. Population, 1926, 97,150.

Physical Features. Czechoslovakia has a natural boundary, being hemmed in on the northeast by the Carpathian Mountains, on the south by the Danube River, and on the west and northwest by the Bohemian Forests, Erz Gebirge, Sudetea, and Giant Mountains, which quite surround Bohemia. Although Czechoslovakia lies in the same latitudes as Northern France and Southern England, it has a much more extreme climate—cold winters and hot summers. Practically one-third of the entire area of the country is in forest; the remainder is very fertile.

Commerce and Industry. Because of the wealth of its natural resources, Czechoslovakia is one of the richest sections in Europe. The fertile lowlands make possible a high development of agriculture. Intensive farming is carried on, and agricultural products are important in the state's commerce. There are over 170 sugar factories, 575 breweries, and 860 distilleries. Czechoslovakia produces about 10,000 tons of hops yearly. Orchard fruits, hemp, tobacco, and flax are also cultivated, though to a lesser extent. The extensive wooded lands are of considerable commercial importance; they provide a large output of timber and paper pulp. The abundant supply of coal is of special value to manufacturers. Iron ore, zinc, lead, gold, and silver are also quite plentiful. There are over 2,000 textile mills, 2,000 glass and stone factories, 1,850 food factories, 1,250 wood manufactories, and many metal and chemical factories and paper mills.

Education and Religion. The great problem of education in Czechoslovakia is the adjustment of schools in accordance with the demands of the different nationalities and languages constituting the republic. Czech, Slovakian, German, Polish, Hungarian, and Ruthenian are the languages of instruction throughout the republic, and sometimes two or three different languages are used in a single school. The school system is very complete, from kindergarten to university. Education is

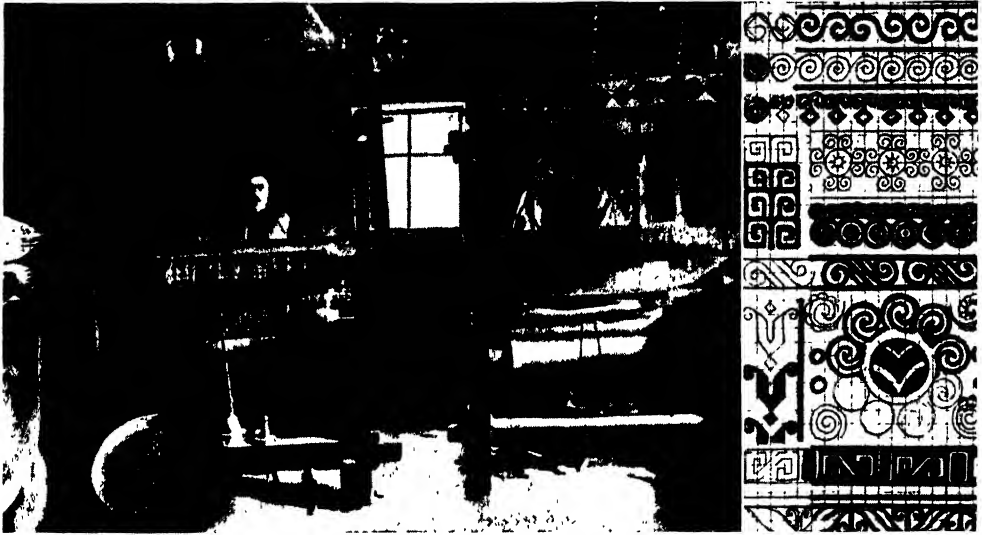


Photo. Keystone

AN AGE-OLD HOME INDUSTRY

Czechoslovak peasants weaving in the home At right are authentic Czech patterns

compulsory for all children from six to fourteen years of age. In Bohemia, Moravia, and Silesia, where Czech is spoken, education is widespread, and illiteracy is low, but in Slovakia and Ruthenia, the percentage of illiteracy is much higher. There are four universities, with a total enrollment of more than 15,000 students, and four higher technical schools.

The majority of the people of Czechoslovakia are Roman Catholics. The Greek Orthodox, Jewish, Protestant, and other faiths form the minority.

Government. Although the Czechoslovakian state came into existence on October 28, 1918, it was not until February, 1920, that the Constitution was adopted by the National Assembly. This little state has at its head a President and a legislative body called the National Parliament, which consists of 450 members. This legislative body is composed of the Chamber of Deputies, with 300 members, elected for a term of six years, and a Senate with 150 members, elected for eight years. Czechoslovakia is a democratic republic—elections are based on proportional representation, and the right to vote is granted to all adult citizens, women as well as men. The President is elected every seven years, in a joint session of the two legislative chambers. He may be reelected for the succeeding term, but seven years must intervene between the second and a possible third term. This latter provision does not apply to the first President, who, it is declared, will be President as long as he lives. President Masaryk, an able statesman, was accordingly reelected in 1927

History. The date when the Slavic people called Czechs first entered the territory which is now Czechoslovakia is uncertain, but it is known that Czechs were settled in Bohemia, Moravia, and parts of Silesia as early as the sixth century. The spirit of nationality has always been strong among the Czechs, and for a brief time the little monarchy of Bohemia was one of the strongest powers of Europe. They struggled against the rule of foreign dynasties, and were able to stay for a time the Germanization of the kingdom, but when they fell into the possession of the Hapsburgs, their opposition was crushed by Austrian rule. Wedged in as it is between Austria, Hungary, and Germany, it became the battle ground of many wars. As a result of the Thirty Years' War, the Czech nation lost its political independence; however, its people never abandoned the idea of regaining it. While the nation was struggling to withstand the pressure of Germany, the Slovaks were slowly succumbing to the Magyars of Hungary. While both the Czechs and the Slovaks were completely in sympathy with the Western European democracy, their geographical position made opposition to the Germanic powers difficult at the time of the World War.

With the idea of achieving independence for the Czech and Slovak territories, troops were turned over to the Allies, and secret allied organizations were formed. As early as 1914, Professor Masaryk went abroad to organize the Czech campaign against Austria-Hungary. In Russia, France, England, and Canada many Czechs joined the allied forces. In 1915, steps were taken to form a Czecho-

slovak foreign committee, for the purpose of carrying on a struggle against Austria. A year later, the foreign committee was transformed into a National Czechoslovak Council. In 1917, an independent Czechoslovak army was established in France. In the meantime, the Czechoslovak troops in Russia started for France, by way of Siberia. In the northland, they fought the Bolshevik revolutionists, and were kept there by the allied powers to guard the Trans-Siberian Railroad. The significance of the Czech success in Siberia was the growing appreciation of them in the allied states, which greatly strengthened the Czech cause. Thus it came about that the Entente powers readily gave the new state recognition, and on October 28, 1918, the Czechoslovakian republic came into existence.

Racial problems have caused considerable difficulty since the beginning of the reorganization of the government. Another problem which the government faces is the separation of Church and State. The attempt to separate religion and the government was opposed by the Vatican. In spite of the numerous political, social, and religious difficulties within the state, Czechoslovakia has built up a system of commercial and political treaties with foreign powers. Trade agreements were con-

cluded with Switzerland, Germany, Bulgaria, Yugoslavia, and France in 1920; with Italy, Rumania, and Austria, in 1921; with Russia, the Ukraine, Latvia, and Portugal, in 1922; The Netherlands, Lithuania, Great Britain, France, Norway, and the United States, in 1923; Denmark, Italy, Iceland, and Austria, in 1924; Greece, Sweden, Poland, Austria, Spain, Turkey, Bulgaria, Japan, and Belgium, in 1925.

Treaties of arbitration were concluded with Germany and Poland in 1925, and with Austria, Sweden, and Denmark in 1926. The foreign policy of the new republic is one of peace, conciliation, and coöperation, its main purpose being the maintenance by peaceful means of the established political and territorial status of Europe. P.K.F. AND J.F.M'K.

Related Subjects. The reader is referred in these volumes to the following articles

Austria	Moravia
Bohemia	Ruthenia
Czech	Silesia
Hungary	Slovaks
Magyars	Thirty Years' War
Masaryk, Thomas	World War

CZERNOWITZ, *cher' no vits*. See RUMANIA (Principal Cities).

THE WORLD BOOK

MODERN
ENCYCLOPEDIA
COMPREHENSIVE

PICTORIAL

Dd

D, the fourth letter in the English alphabet, which was developed from the Greek Δ , or *della*, written in the form of a triangle. When the Greeks adopted this letter, they changed its name from *daleth*, meaning *door*, to



delta. The Phoenicians called the character *daleth*, or *door*, because it resembled the door of a tent, a familiar object at all times to that people. To make the sound of *d*, the tip of the tongue is touched to the roof of the mouth and the breath is then forcibly expelled.

In Roman notation, *D* represents 500, and with a horizontal stroke over it (\bar{D}) it stands for 5,000.

DACHSHUND, *daKhs' hoont*, a long-bodied, short-legged dog of German origin, once used in Central Europe almost solely for hunting badgers, but now kept as a pet in households of many countries. It is a sturdy animal, with strongly developed muscles. This strangely formed dog has been humorously described as being "a dog and a half long and half a dog high." It has a long, round body, with short, thick, somewhat crooked legs; its paws are turned outward, and it has a long, conical head, tapering toward the nose. The broad,



THE DACHSHUND

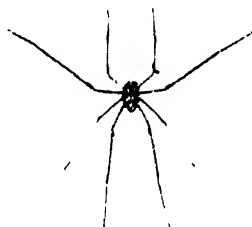
rounded ears are long and drooping, and the tail is long and tapering. This type of dog has many admirers. The coat of most dachshunds is short, thick, and silky, of a reddish-brown tint; but sometimes it is black and tan, gray and tan, or spotted. A variety late in becoming popular is rough-coated. See DOG.

M.J.H.

DACTYLIC, *dak til' ik*, **METER**. See METER.

DADDY-LONG-LEGS, a term applied in America to the *harvestman* or *grandfather*

greybeard, a harmless, spiderlike creature with an oval body and long, slender legs. These are many-jointed, and are held in a bent position, so that the body of the harvestman is suspended among them, close to the ground. The animals form one division of the Arachnida (which see).



DADDY-LONG-LEGS

In England, the term signifies the *crane fly*, which also has long, slender legs, but has wings and resembles a mosquito. A species of crane fly which lives in the earth destroys grains and grass, and is found in the United States and Canada as well as in England. S.H.S.

DAEDALUS, *ded' a lus*, in Greek mythology a sculptor, architect, and artisan. He was worshiped by ancient artists' guilds as the personification of art and as the inventor of carpentry and many tools. Through jealousy, according to the myth, Daedalus killed his nephew and pupil, Talos, and was obliged to flee from Athens to Crete. There he built the famous labyrinth and Ariadne's dancing-place, both of which have been unearthed by modern excavators. Later, having offended the king, he and his son, Icarus, were imprisoned. To effect an escape, Daedalus made two pairs of wings, which they fastened on their shoulders. According to the myth, Icarus fell into the sea, because he flew so near the sun that the wax which fastened the wings was melted. Daedalus landed



Photos Visual Education Service; O R O C

DAFFODILS BOW THEIR BLADES TO THE WINDS OF EARLY SPRING

A field of these flowers in April, near Haarlem, Holland, the center of an extensive floricultural region. In the insert are specimens of the common daffodil

safely in Sicily, where he built several famous temples.

Derivation. The name is from the Greek, and means *the cunning worker*

DAFFODIL, *daf' o dil*, an old-fashioned, ever-popular, early spring flower, a species of narcissus. It is a native of Europe, where it grows wild in woods and hedges, but it is extensively cultivated in America, Holland, and England. There are various forms of daffodils. The best known is the *trumpet daffodil*, which inspired Shakespeare, Milton, Wordsworth, and many other poets, and whose gay blossoms, masses of captured sunshine, bring to mind the chant of English children—

Daffy-down-dilly, just come to town,
With a yellow petticoat and a green gown.

This species bears a long, yellow tube with a crinkly edge, surrounded at the base by long yellow petals. One flower appears at the end of each stalk, standing out at right angles. The narrow, bluish-green leaves are nearly flat, and five or six grow about each flower stalk. The *Van Sion* is one of the fine double daffodils listed in catalogues.

Daffodil bulbs should be planted in autumn or early winter, and should be placed four inches deep and about three inches apart in free, open soil. Blossoms will appear in April.

If kept indoors for winter-blooming, flowers are produced in January. See NARCISSUS. B.M.D.

Scientific Name. The daffodils belong to the family *Amaryllidaceae*. The botanical name of the trumpet daffodil is *Narcissus pseudonarcissus*

DAFNE, *daf' ne*, the first opera ever written. See OPERA.

DAGO, *dag' uh*, an island belonging to Estonia (which see).

DAGON, *da' gon*, a god of the Philistines. See SAMSON.

DAGUERRETYPE, *da ger' o type*, the name given to the first practical photographic invention, perfected by Daguerre in 1839. The process was far more complicated than any involved in modern photography, and the results obtained would now be considered most commonplace, but at the time of the invention they caused a sensation in the scientific world. The process consisted in first sensitizing a polished copper plate by coating it with chemically pure silver. Then the plate was submitted to the action of vapor iodine; following this, it received further treatment with vapor of bromine. After exposure in a camera, the plate was developed in vapor of mercury and immersed in a solution of hyposulphite of soda, to render the image permanent. The finished picture was not much

inferior to the later "tintype," both being printed on thin copper plates (see PHOTOGRAPHY). Samuel F. B. Morse, inventor of the telegraph, took the first daguerreotype in the United States. See illustration, page 1807.

Louis Jacques Mandé Daguerre (1789-1851), a French artist and scene painter, famous as the inventor of the original photographic process described above. Although he has received all the credit of the invention, it is known that he had long corresponded with other Frenchmen who were conducting researches along the same lines; one who was approaching success died before his discovery could be announced. In recognition of his work, Daguerre was made an officer of the Legion of Honor and was given a pension.

DAHLIA, *dahl' yah*, or *dale' yah*, a hardy plant of the composite family, once considered coarse and common, but of late appearing in such improved varieties that its wonderful development attracts almost as much attention as that of the chrysanthemum. It was named after the Swedish botanist, Dahl. Though a native of Mexico, the dahlia is now extensively cultivated in the United States, Southern Canada, and Europe. Originally a flower with eight red rays about a yellow center, very stiff and formal, the dahlia is now produced in varieties of almost every imaginable color and form, some compact and ball-shaped, others with long, flat petals; and the most interesting and beautiful, the cactus dahlias, have double blossoms with long, twisted petals.

In the latitude of New York, dahlias planted in May in rich soil will often come to blossom in July or August, but under the climatic conditions of the Middle West, they are often caught by early frosts. They must have plenty of water, a bucket a day for

each plant being necessary if the season is dry. The water should be poured about the main stalk, not over the soil surrounding the plant.

In case the soil is only moderately fertile, it should have an application of fertilizer in the middle of the summer, but nitrogen should be used sparingly, for it tends to make foliage at the expense of bloom. As the stalks of the plants are very brittle, they should be tied to strong stakes; otherwise, a hard wind or a violent downpour of rain may break them. If the stakes are painted green, they will tone attractively with the foliage. B.M.D.

Scientific Names. The dahlias belong to the family *Compositae* (see COMPOSITE FAMILY). Cactus dahlias are derived from *Dahlia juarezii*, and most of the other cultivated forms from *D. variabilis*.

DAHOMÉY, *dah ho' may*, or *dah ho may'*, a French colony in West Africa, formerly an independent kingdom ruled by a monarch whose power was absolute. The French obtained possession of it in 1892, during the period in which the European powers were dividing Africa among them; the army time the capital, claimed a French protectorate. Population, 861,000; area, 42,460 square miles.

DAHR-EL-KODIB, *dahr el-ko' dib*. See LEBANON, MOUNTAINS OF.

DAIL EIREANN, *dawl a'-rin*, the designation given to the lower house, or Chamber of

Deputies, of the Irish Free State (the upper house being called Seanid Eireann, or the Senate). It is Gaelic for "Irish Parliament." In December, 1918, Parliamentary elections were held throughout Great Britain. In Ireland, seventy-three Sinn Féin candidates, some of them in prison, were elected, but all refused to take their seats in the London Parliament. Instead, twenty-five of them assembled in the Mansion

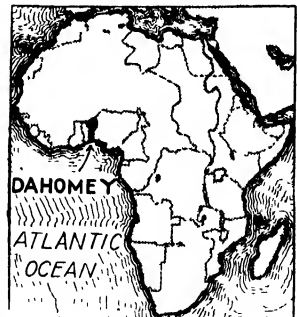


IN MEMORY OF DAGUERRE

Monument in the National Museum, Washington, D. C.



DAHLIAS



LOCATION MAP

House in Dublin, on January 21, 1919, and constituted themselves the Parliament (Dail Eireann) of the Irish Republic. Eamon de Valera was elected President of the Republic, and a committee was appointed to present the claims of Ireland at the Paris Peace Conference. The so-called Irish Republic was not recognized by any nation, but the Irish people outside of Ulster looked to the Dail as their representative assembly during the whole period of guerilla warfare between the Republican army and the British "black and tans."

In December, 1920, a new Government of Ireland Act was passed by the British House of Commons, which provided for two Parliaments in Ireland, one in the North and one in the South. Ulster accepted the act, held elections, and organized its Parliament, but in the South, where Sinn Feiners won 124 out of 128 seats, the act was ignored, and a new Dail Eireann assembled. This

Parliament continued to function during the negotiations between the English and the Irish envoys, which began in July, 1921. A treaty providing for the establishment of the Irish Free State, to have the same status in the empire as

Canada, Australia, South Africa, Newfoundland, and New Zealand, was finally agreed upon, on December 6, and was presented to Dail Eireann for ratification; this was accomplished within three months; and in 1926 the Free State was included in the grant of practical independence to six dominions. See IRELAND; VALERA, EAMON DE; SINN FEIN.

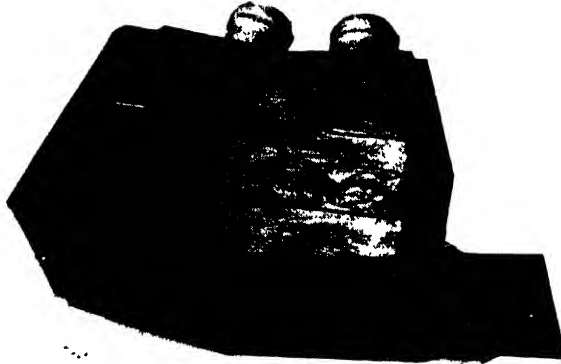


Photo Keyest me

STEREOSCOPIC DAGUERREOTYPE CAMERA

This crude device was invented in 1854 by Silas Holmes, and was modeled after the Daguerre European pattern. It is now in the Smithsonian Institution, Washington, D C

DAIMIO, *di' myo*, early Japanese feudal chief. See JAPAN (History: The Middle Age).

DAIREN, *di ren'*, OR **DALNY**. See MANCHURIA (People and Cities).

DAIRY INDUSTRY, BUREAU OF. See AGRICULTURE, UNITED STATES DEPARTMENT OF



DAIRYING, OR DAIRY HUSBANDRY, is that branch of agriculture which deals with milk and its products. In the various countries of the world, local physical conditions have determined in each case the animal best suited for dairy purposes. The Arabs of the deserts obtain milk from their camels, and the Laplanders of the North keep reindeer for their milk. Some of the Tartar tribes of Asia to this day keep mares for their milk, and in many parts of the temperate regions the milk of goats and sheep is a staple article of food. In India the natives get their supply of milk from the buffalo. But of all the animals whose

milk is used for food, the cow is the most common, and it is the only one which need be considered here. The American dairy industry is concerned exclusively with cows.

Dairy Management. To conduct a dairy successfully requires a variety of knowledge and careful attention to certain principles of management. Careful selection of the herd, properly constructed stables and other buildings, proper feed and pasturage, and lastly, facilities for storing and marketing the product, are the principal points to be considered.

The Herd. The cows should be selected with reference to the main purpose for which



Photo Keystone

MILKING SCENE IN A NEW JERSEY DAIRY

the dairy is conducted. If the dairy supplies milk to city markets, the quantity of milk produced should be the determining factor; and if the dairy supplies butter, the percentage of butter fat in the milk should be the principal point to consider. It is the general experience of dairymen that the Holsteins and Ayrshires, being cattle whose milk contains only small globules of fat, produce large quantities of milk. The Jerseys and Guernseys, on the other hand, provide milk which is much richer in fat, and are therefore the best breeds if the dairy is primarily a butter producer, pro-

vided each cow is an economical converter of food into milk.

On a good dairy farm, a daily record is kept of the amount of milk obtained from each cow. Any cows which do not maintain the required standard should be sold or fattened for beef, and their places taken by other animals.

It is more profitable to milk one cow than two, and while the average milk production per cow per year is about 3,500 pounds, there are many cows in the dairy sections of America that give 7,000 pounds of milk per year, from

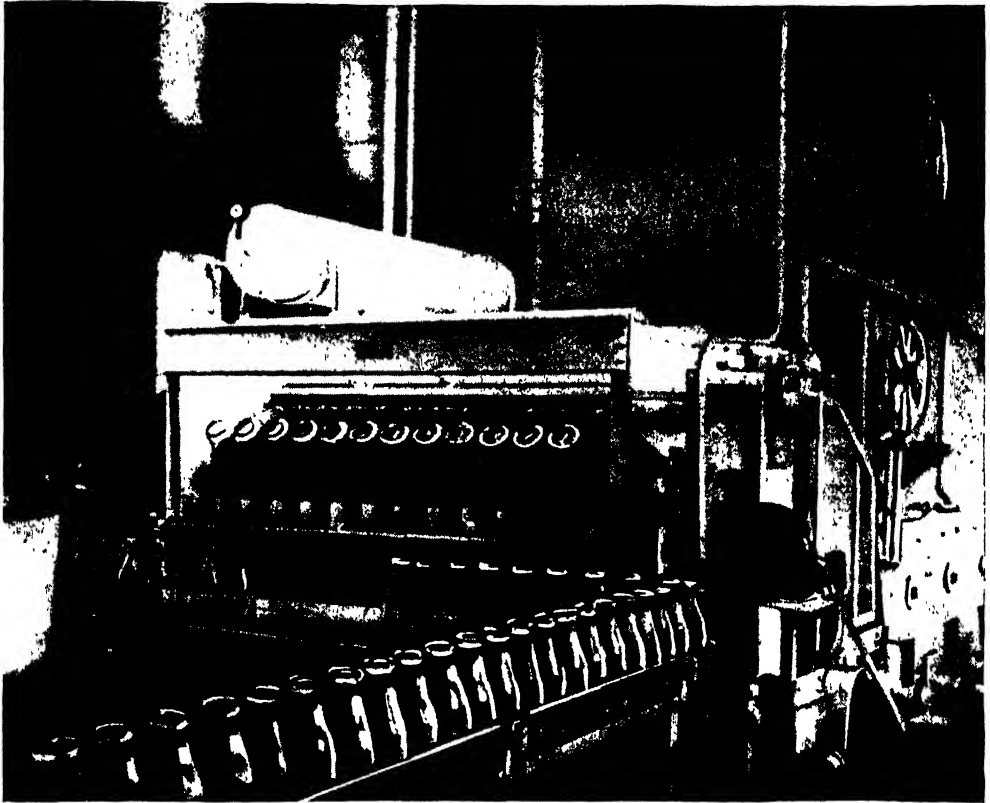


Photo. Visual Education Service

STERILIZING MILK BOTTLES

How this necessary operation is performed in a large dairy bath. The bottles pass through a washing and steaming bath.

which about 300 pounds of butter can be made. Such a quantity sells for \$150, to which must be added the value of the skim milk and the buttermilk, worth at least \$50 more. To the gross income of \$200 per cow per year must be added the value of the cow's calf every year. Only the calves from the best milkers should be retained for additions to the herd. In this way, the herd will be strengthened from year to year. The record should give the daily quantity of milk given by each cow, as well as the total for six months or a year. The most profitable cows are those which give a uniform quantity over a long period of time. The record should also include the results of tests for the amount of butter fat. These tests should be made by experts, if possible, but if this is out of the question, the dairyman can get directions and assistance from any agricultural experiment station.

The Stable. The proper housing of cows is usually the most important factor in preserving their health. Tuberculosis and other diseases are frequently the result of filthy and

poorly ventilated stables. The stables should be well lighted, and should always have an abundance of fresh air. The walls should be kept free from accumulations of dust, and should be whitewashed frequently. The floors should be kept clean, and should be covered with fresh litter every day. Partitions made of piping or iron railing are better than wooden ones, because they catch less dust and are easier to clean. The grounds in the vicinity of the stable should be kept as clean as the interior, and rubbish or manure heaps should not be allowed to accumulate.

The Feed Problem. Fresh grass is generally regarded as a most desirable feed for milch cows, but it seldom happens that the available pasturage is sufficient to feed a large herd. Some other source of food supply must be available at all times of the year, and during the winter months the cows must be fed entirely from this other source. Once the proper ration is determined, the most economic method of supplying it should be installed. Most farmers now use ensilage, or silage, as it

is more commonly called, and the silo is a conspicuous feature in almost all farm landscapes. Full details of its variety and use are given in the article **SILLO**.

Cleanliness a Necessity. Probably no other farm product is as easily spoiled or tainted as milk. It is very sensitive to its surroundings, readily absorbs particles of matter from the atmosphere, and even absorbs odors from articles near it. Tiny particles of dirt, moreover, may contain bacteria, which may render the milk dangerous or may leave it merely disagreeable to the taste. The cows should be milked in their stalls. Sweeping the stalls or littering the cows just before milking should be avoided, because these operations raise dust, which may contaminate the milk. It is desirable, however, to change the air in the stable a short time before, so that it may be fresh and pure. The milkers should wear clean clothing, and their hands should be clean and dry. The flanks and udders of the cow should be wiped with a damp cloth, to remove any dirt which might otherwise fall into the pail. The old-fashioned, wide-topped pail should be avoided; those with small tops, partly covered, are the best. All utensils used in the handling of milk should be cleaned immediately after using, and be scalded with boiling water. A still better plan is to steam them in a vat for several minutes. Wooden pails should not be used.

Development of the Industry. The dairy industry, as a special branch of agriculture, is of nineteenth-century growth, especially in Canada and the United States. Long before 1800, in many parts of the world, cows were being kept for their milk, but the individual farmer kept only as many cows as he needed to supply milk, butter, and cheese for his family. Dairy farming to-day, on the contrary, is a specialty, and a comparatively small number of farmers supply millions of consumers.

While the industry has been growing, it has also undergone a complete change in character. In the beginning of the nineteenth century, it was believed that dairying was limited by physical and climatic conditions to a small part of North America, called the "dairy belt." It was confined, also, to spring and summer, when pasture could be obtained. Cows were usually allowed to go dry in the winter, and winter dairying was practically unknown. Under the system now employed, however, good milk, butter, and cheese can be obtained, by proper management, in almost every part of North America. Cows are well housed in the winter, and give milk practically the whole year round.

Importance of the Industry. *In the United States.* Although it is true that many farmers make dairying their principal source of income, yet there are thousands who keep only a few

cows, to supply milk, butter, and cheese for their families. As most of the latter group keep no accurate records of production, the census figures showing the amount and value of dairy products are somewhat smaller than they should be. The varying conditions under which the industry is carried on in different sections make it hard to find a satisfactory basis for grouping the sections or individual states in the order of their importance. There is no doubt, however, that in the Eastern states, dairying is the principal source of income of most of the farmers who own cows. This is also true through the Central West. In the far Western states, many farmers still keep cows primarily for beef purposes.

In number of cows, the leading states are classed in the following order in most years: the states of Wisconsin, Minnesota, New York, and Iowa each have over 1,000,000 cows, and Wisconsin has over 2,000,000. In the 900,000 class, the states of Illinois, Texas, and Ohio lead, followed in the 800,000 class by Pennsylvania, Michigan, and Missouri. It must be understood that these figures vary considerably from year to year. One of the most striking features of the dairy industry in recent years is the development of the factory system in the making of butter and cheese. This feature is discussed in the article **CREAMERY**.

In the Dominion of Canada. Dairying was naturally one of the first branches of agriculture practiced by the early colonists. The farmers of New Brunswick and Nova Scotia were famous at an early day for the excellence of their dairy products. As settlement spread westward, dairying kept pace with it, and as early as 1852 cows were kept with success at Fort Simpson. At Fort Good Hope, just outside the Arctic Circle, and at York Factory, on Hudson Bay, as well as other remote points, cows have been kept for many years. These examples merely show the widespread character of the industry. Ontario is still, and has been for over half a century, the center of dairying. It has over 1,000,000 milch cows, more than one-third of all the milch cows in the Dominion, and its annual output of milk is nearly half that of the Dominion. Ontario's output is approximately 4,500,000,000 pounds, or 2,250,000,000 quarts of milk a year; the Dominion yield is about 10,000,000,000 pounds, or 5,000,000,000 quarts. Quebec is not far behind Ontario, having over 800,000 milch cows and an annual output of 1,500,000,000 quarts of milk a year. Ontario and Quebec together furnish about seventy per cent of the Dominion's output of milk. A conservative estimate places the annual value of all dairy products at \$100,000,000, an increase of more than sixty per cent since 1900. Most of these products are made for domestic consumption, but over \$20,000,000 worth of cheese is exported each year,

all but one per cent being sold to Great Britain and Ireland. Canadian cheese is famous the world over. E.H.F.

Related Subjects. For more detailed information as to the various phases of dairying, the following articles in these volumes should be consulted.

Agriculture	Creamery
Butter	Cream Separator
Buttermilk	Disease (Diseases of
Cattle	Animals)
Cheese	Intensive Farming
Churn	Milk
Cow	Silo and Silage

DAISY, "the poet's darling," is a familiar and favorite flower in England. This dainty little blossom opens in the morning and closes when the sun sets, thus truly earning its name of "day's eye." In America, however, the common white daisy is an entirely different plant, a species of wild chrysanthemum. *Ox-eye daisy*, with reference to its yellow disk, *marguerite*, a poetic name, and *whiteweed*, suggesting the farmer's opinion of the plant that runs wild in his fields, are some of the many names of the common daisy. The American

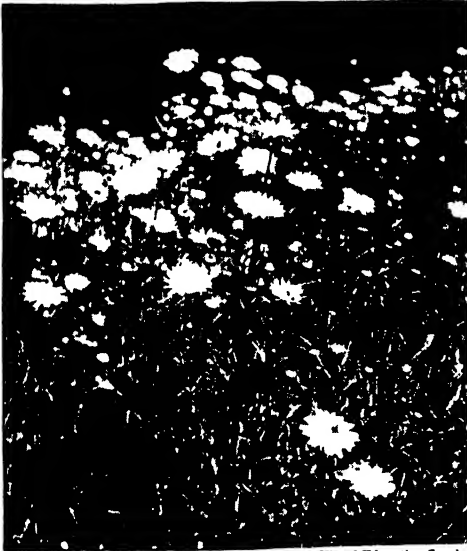


Photo Visual Education Service

OX-EYE DAISIES

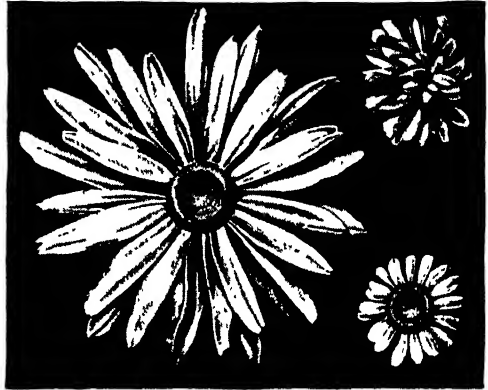
The above flowers are also known as wild marguerites and poverty weeds.

Legion has chosen this plant as its flower emblem, because it is typically American and one of the loveliest of wild flowers.

Many improvements have been wrought in the daisy, some now being double, and there is a great variety of colors. Burbank's Shasta daisy, four inches across, with large pure-white petals, is especially admired in garden borders and for house decoration.

In the United States, the name is loosely applied to other flowers, such as the *black-eyed*

Susan and some wild *asters*. This "unassuming commonplace of nature" was the emblem of love and fidelity in the days of chivalry, but



BURBANK'S SHASTA DAISY

The flower has a diameter of four inches. It was developed from the parent blossoms shown at right and drawn to scale.

in modern flower language, the daisy represents simplicity and modesty. B.M.D.

[See BURBANK, LUTHER; BLACK-EYED SUSAN; and illustration in article BOTANY, subhead *Classification*.]

Scientific Names. Both the English and American daisies belong to the composite family, *Compositae*. The English daisy is *Bellis perennis*; the common white daisy, *Chrysanthemum leucanthemum*.

DAKOTA RIVER. See NORTH DAKOTA.

DALAI LAMA. See TIBET (Government).

DALLAS, GEO. M. See DALLAS, TEX.

DALLAS, dal' as, TEX., the leading industrial city of the state, and, according to estimates of the Census Bureau, the first city in population. Dallas and San Antonio (which see) have long been almost the same size, but Dallas is gradually forging ahead of the "city of a thousand charms," which led in population at the 1920 census. With its tall buildings, some of them skyscrapers, its cosmopolitan population, and its atmosphere of efficiency, Dallas suggests the spirit of the new South, and is often called the "New York of the Southwest." Population, 1928, 217,800 (Federal census estimate).

The city is situated on the Trinity River, in the northeastern part of the state, and in Dallas County, of which it is the county seat. It is thirty-one miles east of Fort Worth, and 210 miles northeast of Austin, the state capital. Its beautiful residential sections, miles of paved streets and boulevards, its playgrounds and recreation centers, and more than fifty parks, help to make it one of the most attractive cities in the Southwest. Of special interest are the grounds and buildings of the Texas State Fair and Marsalis Park; the latter



Photo U.S. Army

AIRPLANE VIEW OF DALLAS

contains the city zoological gardens. Oak Cliff, a residential district on the west side of the Trinity, is connected with the east side by one of the longest concrete viaducts in America.

Transportation. Nine trunk lines of railroad and their branches serve Dallas, and about one hundred passenger trains enter and leave the Union Terminal Station daily. The city is but forty-three hours from New York. The railways are the Missouri, Kansas & Texas; the Texas & Pacific; the Texas & New Orleans; the Gulf, Colorado & Santa Fe; the Frisco; the Fort Worth & Denver City; the Chicago, Rock Island & Gulf, the Saint Louis Southwestern, and the Houston & Texas Central. Trinity River will be turned into a new channel to make possible an airport in the heart of the city.

Industries. The surrounding region is a part of the black-waxy belt, famous for its agricultural products, especially cotton. Dallas is one of the largest inland cotton markets in the United States. The city has over 500 wholesale houses and more than 700 factories. It is a leading center for the manufacture of harness, saddlery, and cotton-gin machinery, and a distributing center for agricultural implements and automobiles. Among other important industrial enterprises are flour mills, cement plants, oil refineries, iron and metal works, cottonseed-oil mills, cotton compresses, packing houses, and grain elevators.

Institutions. Dallas is the seat of two universities, Dallas University (Catholic, for men and boys), and

the Southern Methodist University. The schools of medicine, pharmacy, nursing, and dentistry of Baylor University are also located here. There are eighty private schools. Dallas is the see of Roman Catholic and Protestant Episcopal dioceses.

History. The first settlement, known as Peter's Colony, was made in 1841. Four years later the name was changed to Dallas, in honor of George Mifflin Dallas, Vice-President of the United States under James K. Polk. In 1871 the town was incorporated as a city. Since 1907 Dallas has had the commission form of government, which is vested in a mayor and four commissioners.

DALLES, dalz, a name derived from the French *dalle*, meaning *trough*, or *drain*, was applied by French explorers in America to rocky gorges through which rivers flow at great speed. There are several in North America, among which are the picturesque dalles in Wisconsin, near Kilbourne (but locally they are called *The Dells*), the Saint Louis dalles, a series of cataracts in the Saint Louis River, near Duluth, Minn.; the Saint Croix dalles, in the same state; and the famous dalles of the Columbia River, which have given the name *The Dalles* to the oldest town in Oregon.

In the Columbia River. The dalles of the Columbia begin five miles above the town and

extend upstream from that point for several miles. Within this distance there is a fall of eighty feet, including a sheer fall of twenty feet at the upper, or eastern, end. This fall is known as the *Celilo*, but the Indians and pioneers called it, more picturesquely, *Turn-water*. At the western end is the Big Eddy, terminating what is known as the Long Narrows, or *Les Grandes Dalles*. This latter is a channel cut by natural forces through perpendicular walls of basaltic rock. It is 9,000 feet long and from 135 to 300 feet wide; at low water, the distance from the top of the wall to the water is fifty feet.

Through this gorge, which is so workmanlike in appearance that it seems to have been constructed by the hand of man, the entire volume of the river rushes, and the water boils and surges so violently that the river seems, so to speak, to be turned on edge. Beyond this stretch to Celilo Falls there are powerful currents and numerous eddies; the dalles are therefore an impassable barrier to navigation. To overcome this obstacle, the United States government has constructed a canal and lock system at a cost of \$5,500,000. See COLUMBIA RIVER; WISCONSIN. R.H.W.

DALMATIA, *dal ma' she ah*, formerly a crownland of Austria-Hungary, but since the World War a province of the kingdom of Yugo-



PROVINCE OF DALMATIA

slavia. A long strip of territory narrowing greatly toward the south, Dalmatia extends for over 200 miles along the eastern shore of the Adriatic Sea, and on its land side adjoins Croatia, Bosnia-Herzegovina, and old Montenegro. Including the numerous islands that fringe its deeply indented shores, it has an area of 4,916 square miles, being almost the same size as Connecticut. The population is about 622,000. Because of a generally mountainous surface, agriculture is in a backward state, but the coast valleys produce olives, grapes, cherries, and other fruits. The Adriatic fisheries are a valuable source of revenue, the chief products being tunny, anchovies, coral, and sponge.

Dalmatia was anciently a part of the Roman Empire. In the seventh century, it was invaded by Slavs, who established themselves in the interior, but were unable to conquer the coast towns, which were powerful city states. After centuries of varying fortune, Dalmatia became a part of Austria-Hungary, in 1815. For further information, see the article YUGOSLAVIA.

DALMORES, *dal mo rez'*, CHARLES (1871-), a noted French tenor, who was born at Nancy, France, and received his musical education at the Paris Conservatory. Before he discovered that he was the possessor of a voice which promised a career, Dalmore's devoted much time to the violoncello. He made his début as a singer at Rouen, in 1899, with such success that after three years he was engaged to appear in Brussels at the Theatre Royal. His Brussels triumphs were repeated at Covent Garden, London, and at Bayreuth, Bavaria. In 1906 he first appeared in the United States as a member of the Manhattan Opera Company, New York. Both in New York and in Chicago, where he sang subsequently, he was recognized as one of the best of contemporary French tenors. Dalmore's won greatest renown as Don José in *Carmen*, Samson in *Samson and Delilah*, Romeo in *Romeo and Juliet*, and Hoffman in the *Tales of Hoffman*.

DALNY, the Russian name for the city of Dairen, in Manchuria (which see).

DALTON, JOHN. See ATOM; CHEMISTRY (Matter Made up of Atoms).

DALTON SCHOOL PLAN, also known as the DALTON LABORATORY PLAN, is a striking departure from the traditional rigidity found in the conventional educational program. The ordinary school exalts the teacher and makes the recitation the chief means of determining the progress of the student; it minimizes the initiative, self-reliance, and interest of the individual pupil. The Dalton Laboratory Plan makes the teacher an advisor or overseer, and gives to the pupil large freedom to follow a program to a considerable degree of his own making, provided only that he works toward established general ends.

The Dalton Plan was developed by Miss Helen Parkhurst, who was formerly at the head of the Montessori schools in America. In England and the United States, she conducted experimental schools based on her plan, for the purpose of testing it. It has now been introduced into more than two thousand schools in England.

In brief, the Dalton idea substitutes laboratory methods for the recitation. Suppose pupils are studying arithmetic in a Dalton Laboratory Plan school. They go to a special arithmetic room in the school. They find on the announcement board in this room the program of work in arithmetic for each month

and for the year. They work in this room at their tasks as long as they wish each day. There is a teacher in the room, who gives advice when it is needed, but there is no recitation. Each pupil comes and goes as and when he chooses, though when he leaves the room he presents for the teacher's approval the work he has accomplished during the period that he has been working there.

If he should come into the arithmetic room the first thing in the morning and wish to remain until noon, because of his interest, he would not be interfered with. Other pupils might come and go, but he would remain. If he could complete the month's contract in one morning, he would be permitted to do so. Each pupil is provided with a score card, so that he can check what he has accomplished with the requirements for the month or the year. If he should wish to spend all his forenoons in the arithmetic laboratory until he has completed the program for a year, he would be free to do so. Each individual is permitted to work in any laboratory so long as he is interested, and as rapidly as his abilities will permit.

There is a laboratory for each subject that is taught in the school. A pupil may go at any time to any laboratory in which he is interested, and apply himself to his contract. The teacher acts as a guide and counselor, but not as a recitation hearer, although she conducts quizzes, written and oral, as often as she thinks it necessary to test what pupils are actually accomplishing.

There are no class periods in a school operated according to the Dalton Laboratory Plan. The pupils do not move here and there in response to signals; they move according to their interest and the results they have achieved in any given laboratory.

The claim is made that this plan of work stimulates every pupil to do his best. It gives opportunity to a pupil of superior ability to progress more rapidly than one of mediocre ability. It develops self-control, initiative, and self-reliance in a pupil, and it accustoms him to perform tasks in the way in which they will have to be performed in the world outside. The teachers who are working in the experimental schools in which the Dalton Laboratory Plan is in operation testify that it accomplishes the aims claimed for it. See *EDUCATION* (Modern Tendencies in Education); *RUSSIA* (Education). M.V.O'S.

DALY, MARCUS. See *MONTANA* (Mining).

DAM, an artificial barrier to the flow of water, is a device older than history. Nevertheless, it is within the memory of the present generation that dams have entered upon a period of usefulness hitherto not imagined. The great Assuan Dam has added several hundred square miles to the arable lands of Egypt; it

holds back thousands of millions of gallons of the water of the Nile, to be used in irrigation. The dam at Bassano, in Alberta, is a part of the largest irrigation system in America. The Arrowrock Dam, in Idaho, the highest dam in the world, is one of several new irrigation dams which store billions of gallons of water for the United States irrigation service. The Wilson Dam, at Muscle Shoals, greatest in the world, is a unit in a mammoth power scheme. The Croton Dam, one of the highest masonry dams, controls a large part of New York City's water supply. The dam across the Mississippi River from Illinois to Keokuk, Iowa, generates half as much electric power as Niagara. Another important dam is the Gatun, which maintains the level of water in the Panama Canal. All of these great dams have been completed within the present century.

The earliest dams were earthen, and many modern ones, including the Bassano and Gatun dams, are built largely of earth. Timber, in the use of which the beavers anticipated man, makes a very durable dam, but wood is not suited for high structures. Steel has been used in a few dams. As the pressure of the water against a dam is in direct proportion to its depth, the highest dams are built of masonry or concrete, and are widest at the bottom. The Arrowrock, 354 feet high, is of concrete; the Shoshone, in Wyoming, 328.4 feet high, is as yet the world's highest masonry dam. One of the most famous dams in the United States is the Roosevelt, a 280-foot masonry structure over the Salt River in Arizona. One of the newest dams in the United States is the Coolidge Dam, on the Gila River in Arizona. The impounded water will irrigate 100,000 acres.

Three new monster dams were completed in 1930 or work on them was then in progress. The Pacoima Dam in Southern California is 380 feet high; the Diablo, in Washington, 400 feet; the Owyhee, in Oregon, 405 feet

Related Subjects. Wider information on the topic of dams may be gained from the following articles in these volumes

Alberta	Irrigation
Aqueduct	Jetty
Arizona (Roosevelt Dam)	Keokuk Dam
Assuan	Levee
Idaho	Muscle Shoals Reservoir

DAMARISCOTTA, *dam' a ris kot' ah*, **RIVER.** See *MAINE* (Other Items of Interest).

DAMASCUS, *dam as' kus*. "The world began at Damascus, and will end there," says an Eastern proverb. There is little doubt that it is one of the oldest cities in the world. It is the capital of Syria, in Asia, and has been under mandate to France since 1922. Practically nothing is known of its origin; tradition ascribes its founding to Uz, about 2200 B.C.; that it was a place of some importance even in



"The Street Called Straight." In the ancient city of Damascus (see *Acts IX, 11*). Nearly 300 feet of the roof was destroyed by bombardment in 1925

Photo U&U

1815

the days of Abraham is indicated by Biblical references (see *Genesis* XIV, 15). There stood the reputed house of Naaman the Leper (*II Kings* v) until 1925; it was destroyed in the Druses' rebellion. Toward this city Paul was proceeding when he was halted by the blinding light of conversion. There in "The Street called Straight," whose covering of masonry was partly demolished in 1925, still stands the house of Judas, in which the disciple Ananias found the penitent apostle (*Acts* ix).

Damascus remains the most Oriental in manners and customs of all Eastern cities. Most picturesque from a distance, with its myriads of graceful minarets, the city on nearer view presents a less inviting appearance. As of old, the streets are still mean and narrow, the outside of the houses gloomy, forbidding, and in many cases unsanitary. The interiors of the more wealthy homes, however, are often luxurious. Beautiful courts paved with marble, ornamented with trees and shrubs, fountains spraying cooling waters, and refreshing shade await the visitor who passes through the outer door.

The life of this merchant city of the desert centers about its bazaars, consisting of covered streets similar to modern arcades, lined with small shops, displaying each its peculiar ware.

The looms of Damascus, famous for centuries, still weave their beautiful damasks. And the Barada River still waters the lovely gardens and fruitful orchards that stretch for miles along its banks.

An important center of Oriental trade, Damascus is now a busy city, and houses that once shook to the martial tread of Syrian hosts now look down on modern streetcar lines. Once a stronghold of Christianity, Damascus is now a holy city of the Moslems, where vast numbers annually meet for the pilgrimage to Mecca. In the 1925 rebellion of the Druses tribes, the city was severely damaged by shell fire at the hands of the French. See DRUSES.

Damascus has had probably the most eventful history of any Eastern city. In turn under the power of the Syrian, Israelite, Persian, Greek, Roman, and Crusader, it fell at last (1516) into the hands of the Turks, who retained it until the World War. Population, estimated, 250,000. See SYRIA.

Damascus Steel, a steel of high quality, originally produced in Damascus and other cities of the East, of special value in making highly tempered sword blades. Its extraordinary hardness and elasticity were produced by careful and laborious forging of pure iron and a peculiar steel, containing more carbon than other steel. The sword blades of Damascus were richly ornamented with designs that penetrated completely through the metal without in any way affecting its strength and temper.

DAMASK, *dam' ask*, originally a "flat-figured satin" in which the weft was woven

into the warp in such a way as to make figures such as fruit, flowers, and leaves. The name was given the fabric from Damascus, the city where it was first manufactured. The varieties now most widely known are the linen damasks used for tablecloths and napkins, so desirable for their soft luster. The best of these are made in France and Ireland. Mercerized cotton damask, imitating the table linens, has come into wide use in recent years. Furniture damask, of silk or wool, is handsome, but not durable.

DAMIETTA, *dam ih et' ah*, EGYPT. See EGYPT (Modern Cities).

DAMOCLES, *dam' o kleez*, a courtier and flatterer of the tyrant Dionysius of Syracuse. His extravagant description of the happiness of kings caused his royal master to read him a lesson. He was invited to a sumptuous banquet and was seated at the table in royal luxury. On looking up, he was horrified to find a sword suspended by a single hair over his head. Dionysius thus desired to emphasize the uncertainty of his life, even when in seeming security. The "sword of Damocles" has come into vogue as an expression referring to impending or dreaded tragedy that may happen at any moment. See DIONYSIUS THE ELDER.

DAMON, *da' mun*, AND **PYTHIAS**, *pith'-ih as*, two noble youths of Syracuse, whose love for each other, recorded in a popular legend, is universally regarded as the highest ideal of friendship. Pythias, or Phintias, had been condemned to death by Dionysius, tyrant of Syracuse. He secured permission to leave the city to put his affairs in order, Damon offering himself as a pledge for his friend's return, to suffer death himself in place of Pythias should the latter fail to keep his promise. Pythias, unexpectedly delayed, arrived just in time to save Damon from death. It is said that Dionysius so admired the spirit of friendship animating the two that he immediately pardoned Pythias and besought the two youths to become his friends. This incident is the basis of the principles on which the fraternal order, the Knights of Pythias, was established (see PYTHIAS, KNIGHTS OF).

DAMROSCH, *dahm' rosh*, the name of a family, originally German, two members of which have played an important part in the advancement of music in the United States.

Leopold Damrosch (1832-1885) was born in Posen, Prussia, and was educated for the medical profession, in accordance with his parents' wishes, at the University of Berlin. In 1854, shortly after he had begun practice in Posen, he took up the formal study of music, to which he was devotedly attached, and in 1855 entered upon the career of a concert violinist. After serving as director in Posen and in Breslau, he emigrated to America in 1871, and began a brilliant career in New York City. He founded the Oratorio

Society in 1873, the Symphony Society in 1877, and organized several large musical festivals.

To Damrosch alone is due the honor of permanently establishing choral societies in New York; but he achieved the crowning glory of his career when, in 1884, he successfully introduced German opera at the Metropolitan Opera House. In this great theater his funeral services were held a year later. He also won distinction as a composer of cantatas, pieces for the violin, songs, and a festival overture.

Walter Johannes Damrosch (1862-), son of Leopold, continued the work which his father had begun. He was born

in Breslau, Prussia, studied piano and harmony, and in 1871 accompanied his father to America. In 1881 he was appointed organist of Plymouth Church, Brooklyn, and four years later, on the death of his father, succeeded him as director of the Oratorio and Symphony societies. The Damrosch Opera Company, founded by him in 1894 for the production of Wagner's music-dramas, toured the United States for several seasons.



Photo P & A

WALTER DAMROSCH

Between 1900 and 1902, he conducted the German operas at the Metropolitan Opera House, in 1902 began a season with the Philharmonic Society, and in 1903 brought about the reorganization of the New York Symphony Orchestra as a permanent orchestra. This organization is now one of the best of its kind. The compositions of Damrosch include two operas, *The Scarlet Letter* and *Cyrano de Bergerac*, a *Te Deum*, a sonata for violin and piano, and several songs. He retired from active work in 1928.

DANA, da' nah, **CHARLES ANDERSON** (1810-1897), for twenty-five years the most noted of American journalists, was born at Hinsdale, N. H. While working in his uncle's store in Buffalo, he prepared himself for Harvard College and entered in 1839, but was obliged to leave after two years, on account of trouble with his eyes. In 1842 he became a member of the Brook Farm Association and edited *The Harbinger* in Boston in its interest (see **BROOK FARM**). In 1847 he joined the staff of the *New York Tribune* and later became its managing editor, resigning from this post on account of differences of opinion with Horace Greeley regarding Mexican War policies. During the latter part of the War of Secession (1863-1864), he was assistant Secretary of War under Stanton. After the war, he edited the *Chicago Republican* for a time, but it failed, and he returned to New York.

In 1868 he became part owner and editor-in-chief of the *New York Sun*, holding this position during the remainder of his life and conducting its interests and policies with such remarkable success as to raise its valuation to

\$5,000,000, an unprecedented amount for a newspaper property in his generation. "If you see it in the *Sun*, it's so," was the slogan he adopted for that journal. The *American Encyclopedia* was edited under his direction, and he also collaborated with General J. H. Wilson in a *Life of Grant*. Dana possessed keen judgment and a brilliant intellect, and his editorials in the *Sun* were widely read for their literary quality. See **NEWSPAPER**.

DANA, JAMES DWIGHT (1813-1895), an American geologist and one of the most eminent scientists of the nineteenth century. In his early school days in Utica, N. Y., his birthplace, he devoted himself to the study of the natural sciences. After graduation from Yale in 1833, he was appointed instructor in the United States navy. This position gave him unusual opportunity for travel and investigation. As a member of the Wilkes Exploration Expedition (1838-1842), sent out by the United States government to explore remote parts of the Pacific Ocean, he made many interesting discoveries concerning marine animals, which he later described in books and reports. From 1855 to 1890, he served as professor of natural history at Yale, and for forty-nine years was editor of the *American Journal of Science*, in which many of his papers were published.

What He Wrote. Among his noted works are *System of Mineralogy*, *Manual of Geology*, *Text-Book of Geology*, *Coral Reefs and Islands*, and reports on *Zoophytes*, *Geology*, and *Crustacea*.

DANA, RICHARD HENRY (1815-1882), the author of *Two Years Before the Mast*, one of the notable books of American literature for boys. From his earliest boyhood, Dana had a passion for the sea, and except for powerful pressure from his family, would have entered the United States navy. Yielding to their wishes, he entered Harvard College, and was apparently started on the beaten path which would have made him a distinguished Boston lawyer. In later life, he did become one of the foremost American authorities on international law, but his work as a lawyer will be long forgotten when *Two Years Before the Mast* still is read with delight.

At nineteen, Dana was a junior in college, when weakness of sight forced him to suspend his studies. He shipped on the brig *Pilgrim*



Photo Brown Bros.

RICHARD HENRY DANA

for a two years' cruise around Cape Horn and along the west coast of North and South America. His father, also Richard Henry Dana (1787-1879), a lawyer and poet of reputation, possessed social prominence and independent means, and young Dana might have gone on a pleasure cruise, a gentleman in search of health. Instead, he shipped as a common sailor, and for two years

there was no burdensome task, no harsh treatment, no stormy weather which constituted the routine for the common sailor, that he did not know at first hand. These experiences are faithfully depicted in the book that brought him fame.

DANAE, a goddess. See PERSEUS.

DANBURY, CONN. See CONNECTICUT (back of map).



DANCING. A sense of rhythm and a delight in graceful movements have been common to human nature in all countries from earliest times. Dancing is as universal as religion, and in its various manifestations it ranges from the war dance of the savage on his return from victory to the artistic performance of a Pavlova.

The grace and rhythm of the dance are paralleled in nature in the rise and fall of the waves upon the shore, the rippling of the brook, the play of light and shadow, or the tossing of the flowers in the wind. These natural forms of rhythm are an especial delight to the poets. In *The Brook*, Tennyson sings:

I slip, I slide, I gloom, I glance,
Among my skimming swallows;
I make the netted sunbeam dance
Against my sandy shallows.

Wordsworth, charmed by the sight of a field of golden daffodils, joyfully exclaims:

Ten thousand saw I at a glance,
Tossing their heads in sprightly dance.

Examples of the poetic expression of the rhythm in nature might be multiplied indefinitely.

Modern Dances. The dances that have enjoyed popularity since the beginning of the modern period had their origin in the general awakening of the arts in the fifteenth century (see RENAISSANCE).

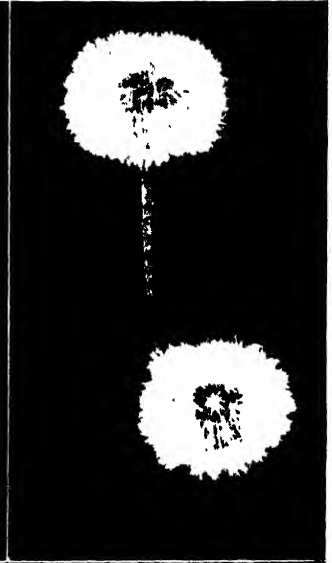
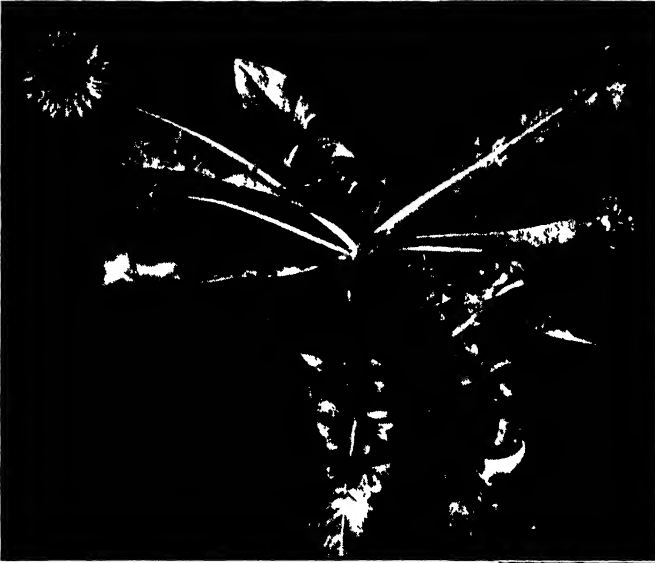
Catharine de' Medici (1519-1589) made dancing fashionable in France, and her countrymen have always excelled in this artistic form of recreation. The dance which they brought to the highest degree of perfection was the *minuet*, founded on an old rustic dance. It was introduced into Paris in 1650, and found its

way into England three years later. This fairest flower of court dances, with its graceful and stately movements, low salutations, and polite curtsies, was a favorite society dance in America in colonial times, where it harmonized beautifully with the quaint and charming costumes of the period.

Of the later modern dances, probably none other has had quite the popularity of the *waltz*, which was introduced into European circles about 1795. It is danced in triple time, with smooth, gliding steps which have a backward and forward direction. The waltz is one of the most graceful ballroom dances, and some of the most exquisite dance music ever composed, notably that of Johann and Richard Strauss, is written in waltz time.

The *two-step*, which came into vogue about 1890, long rivaled the waltz in popularity. This is a more spirited dance than the waltz, and is based on one that was known in Hungary centuries ago, but in its modern form it is of American origin. The tuneful marches of John Philip Sousa are representative of two-step music.

The *quadrille*, a square dance of French origin, participated in by four couples, whose more recent development dates from 1815; the *lancers*, an adaptation of the quadrille, developed about 1836; the *polka*, first danced about 1835; and the *schottische*, a modification of the polka, all had their period of popularity and decline. Occasionally, one sees the old-fashioned square dances enjoyed at informal parties, and the old English country dance survives in the *Virginia reel*, known in the country of its origin as the *Sir Roger de Coverley*. In this dance, the couples face each other in two long rows. A charming description



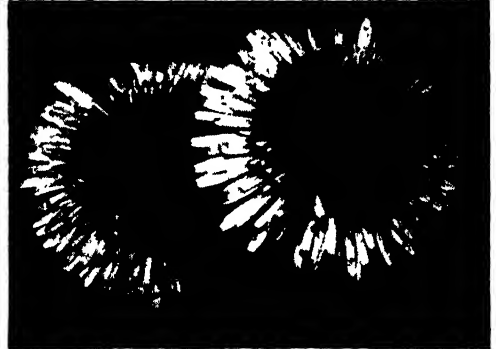
THE DANDELION

The plant, the seed, and the flowers

of the Sir Roger de Coverley may be found in Dickens' *Christmas Carol*, in the story of the Fezziwigs' Christmas ball.

Sensational Dances. In 1911 a curiously named and not altogether refined dance called the *turkey-trot* made its appearance in San Francisco. Modifications of it soon followed—the *bunny hug*, the *grizzly bear*, the *Texas Tommy*, and others—and Europe and America went dance-mad. A great many people objected to these dances on moral grounds. The dances just named were soon replaced by others more refined in character, which were admitted, after some opposition, into standard dancing schools and adopted generally by the dancing public. Most important of these were the *tango*, *one-step*, and *fox-trot*, all based on walking steps, and the *hesitation* and *waltz canter*, modifications of the regular waltz. Dancing in public restaurants by the patrons of these establishments came into vogue with the introduction of these dances. In 1925 the popular fancy was taken by the *Charleston*, a strenuous dance not unlike a jig, demanding violent movement of the lower limbs. It was replaced in a year or two by others of the same type and different names.

On the vaudeville stage, the old-time polka and schottische have been revived, interest in stage dancing has maintained a high level, and many public dancers of genuine artistic ability have made their appearance. Of these the Russian dancer, Anna Pavlova (born 1885), has attained unrivaled perfection in the art. Others who have gained distinction were Isadora Duncan (1878-1927), Ruth St. Denis, and Adeline Genée.



Photos. St. Clair

Primitive and National Dances. In its earliest forms among primitive races, dancing was a mode of expressing strong emotions of joy, sorrow, and triumph, or solemn religious feeling. The North American Indians, in their ferocious war dances, worked themselves up to a state of mental intoxication capable of carrying them irresistibly on to victory. Magic enters largely into the dancing of all savage peoples, as is illustrated by the buffalo dances of the Mandan Indians, the object of which was to bring game in a time of scarcity of food; or the mystic dances of the Central African rain doctors, practiced during a season of drought. National or folk dances are those which are characteristic of the people of particular countries, such as the *fandango* and *bolero* of Spain, the *tarantella* of Italy, the *mazurka* and the *polonaise* of Poland, the *reel* and *Highland fling* of Scotland, and the *jig* of Ireland and Wales.

B.M.W.

DANDELION, the delight of poets, but a nuisance to cultivators of lawn and garden. Lowell's lines paint an attractive picture:

Dear common flower that growest beside the way,
Fringing the dusty road with harmless gold.

But its tendency to grow wild in lawns and meadows has caused it to be regarded by many as a troublesome weed.

The dandelion is found throughout the world, and is sometimes used as a vegetable or a medicine. It was brought to America from Europe by the early colonists. The name comes from French words meaning *tooth of a lion*, and was suggested by the smooth, coarsely toothed leaves. The flower head is a lovely golden-yellow, and the seed head later is a cottonlike, white "blowball" of feathered seeds which sail far and wide on the winds and so are well distributed [see SEEDS (Seed Dispersal)]. The flower stem is smooth, erect, and hollow, and the entire plant contains a white, milky juice.

Young dandelion leaves are often used for greens and salads. It is best to gather the leaves when they are young, before the plant has blossomed. If blanched like celery, they will become more tender and less bitter. If the plants are troublesome on lawns, they may be eradicated, but only

by very deep cutting. In soft, rich earth, the roots often penetrate more than three feet. Slicing close under the surface of the ground only encourages the plants to grow. Persistent dandelion growths may be killed by spraying with iron-sulphate solution, mixed in the proportion of one and one-half to two pounds per gallon of water.

The thick, fleshy taproots, washed and dried, have certain medicinal qualities and are sometimes imported.

B.M.D.



ROOT OF DANDELION

The length of the root is from ten to twenty times the height of the plant above the ground

Classification. The dandelion belongs to the family *Compositae*, which contains also the sunflower, thistle, daisy, lettuce, goldenrod, and chrysanthemum. Its botanical name is *Taraxacum officinale*.

DANDIE DINMONT, *dan' dy din' mont*. See TERRIER.

DANDRUFF, a material thrown off by the hairy parts of the skin. It is composed of cells and flakes of shed skin mixed with grease from the grease glands, water and salt from the sweat glands, dirt from the air, and some hair. Some scaling is normal. When the scaling becomes excessive, the product is called dandruff. Most simple scalp disorders resulting in dandruff can be prevented by proper washing, brushing, and occasional oiling of the hair and scalp. They can be cured by the same procedures, more thoroughly carried out.

Some cases of dandruff are the result of a disease called *seborrhoea*, which some authorities hold to be a bacterial disease. In *seborrhoea*, there is itching. Sometimes the scalp is red, and the dandruff is more greasy. While care of the scalp and hair is of service in curing *seborrhoea*, the services of a physician are advisable. It may be necessary to cleanse the scalp with creams instead of water, and to apply preparations of sulphur.

Dandruff is commonly given as a cause of baldness (which see). If the skin of the scalp were kept as clean as we keep our skin generally, there would be less dandruff and less baldness. Every person should refuse to let another use his hair brush and comb.

W.A.E.

DANELAGH, *dane' lah*, THE. See ALFRED THE GREAT.

DANIEL, *dan' yel*. No other Biblical character is more popular, for his wonderful rise from the position of captive and slave in a royal household to that of ruler of the kingdom was brought about not through kingly favor but through Daniel's own wisdom and goodness. When Nebuchadnezzar, king of Babylon, swept down upon Jerusalem, he carried off not only the sacred vessels from the Temple but a number of high-born youths, of whom Daniel was one. In Babylon, Daniel refused to eat of his "portion of the king's meat," lest he might defile himself, but throve so well on his simple diet that he attracted the notice of the king.

One night, King Nebuchadnezzar had a troublesome dream, which his wise men could not interpret. But Daniel, declaring that "there is a God in heaven that revealeth secrets," described the dream and gave the interpretation, and as a reward, was made ruler over the whole district of Babylon. In later years, he made clear another royal dream, which foretold the madness of Nebuchadnezzar, and interpreted to Belshazzar, the son of Nebuchadnezzar, the marvelous handwriting on the wall. Under Darius, the Median,



"DANIEL'S ANSWER TO THE KING"

From the painting by Riviere

who fulfilled the writing by capturing Babylon, Daniel was given high authority by reason of his wisdom, but the Babylonian princes became jealous, and by a trick had him cast into a den of lions. His miraculous preservation led Darius to acknowledge the God of the Hebrews and put an end to the persecutions of Daniel, who from this time on "prospered in the reign of Darius, and in the reign of Cyrus the Persian."

Related Subjects. For historical relations, the reader is referred in these volumes to the following articles

Babylonia Belshazzar Darius Nebuchadnezzar

DANIELL CELL. See ELECTRIC BATTERY (Closed-Circuit Cells).

DANISH, dayn' ish, WEST INDIES. See VIRGIN ISLANDS OF THE UNITED STATES.

DANNEKER, dan' ek ur, JOHANN. See SCULPTURE (Germany).

DANTE ALIGHIERI, dahn' ta ah le gya' re (1265-1321), one of the world's great poets, the chief pride and ornament of Italian literature. As Homer's name is associated with the *Iliad*, Vergil's with the *Aeneid*, and Milton's with *Paradise Lost*, so that of Dante, the fourth great epic poet, calls instantly to mind the *Divine Comedy*—that marvelous account of the wanderings of a soul in hell and purgatory. No less intimately connected with the name of Dante is that of Beatrice, the idol of his life from childhood and the inspiration of his poetry, although he saw her only a few

times, and she had very little knowledge of him. He tells in his *New Life* of meeting her when he was but nine years of age, and traces the course of his love. This was an idealized emotion, far removed from desire for possession and from jealousy, for he loved her just as devotedly and with no hint of bitterness after her marriage to another (see BEATRICE PORTINARI).

Dante was born in Florence, of a family which probably belonged to the lower nobility, and though little is known of his youth and education, it seems certain that he was associated with the artists and learned men of his time. In 1292, when he had recovered from the grief into which the death of Beatrice plunged him, he married Gemma Donati, who bore him two sons and two daughters. Shortly after his marriage, he entered politics, and in the Florence of those days, this promised anything but a peaceful life. The Guelphs (see GUELPHS AND Ghibellines) soon split up into two rival factions known as the Whites and the Blacks, and Dante allied himself with the former, the more moderate branch. When the Blacks, or Papal party, came into power in 1302, the leaders of the Whites were banished, and with them, Dante. For the rest of his life he was an exile, and his history during that time is semi-mythical. He visited several cities, but certainly not all that have since put forward claims to that honor, and in September, 1321, died at Ravenna, where he was buried.



Photos Visual Education Service, Brown Bros

THE HOME OF DANTE, AND PORTRAIT OF THE GREAT POET

His Great Work. Dante wrote other things—*The New Life*, mentioned above, *The Banquet*, and a treatise *On Monarchy*; but his fame rests on the *Divine Comedy*. This he called *Comedy*, in accordance with the custom of the time, because it ends cheerfully, and appreciative readers added the epithet *Divine*. In large part, at least, it was written during his exile, and shows the firm grasp and keen insight of a mature man. It represents the poet as traveling through hell and purgatory under the guidance of Vergil, and through paradise with the radiant, glorified Beatrice as his leader. In hell, over the gate of which appear the words, "All hope abandon, ye who enter here," he sees the hosts of guilty souls, whose sin and punishment he pictures in few words but with passionate force; in purgatory there are like scenes, but the gloom is not so deep, as the penalties imposed are alleged to be merely temporary.

With entrance into the earthly paradise, all that is sordid and evil disappears, and the poet moves with Beatrice through beautiful flowers, soft breezes, and sweet sounds. Finally, he emerges into the celestial paradise, where he feels himself in the presence of God, but cannot see Him because of the excess of light. So, in a burst of triumph, ends this greatest poem which the Middle Ages produced. It has been translated into many languages, Longfellow having made an excellent reproduction into English, and an enormous number of books

have been written about it. Interest in it bids fair to remain unflagging as long as men love great poetry.

B.M.W.

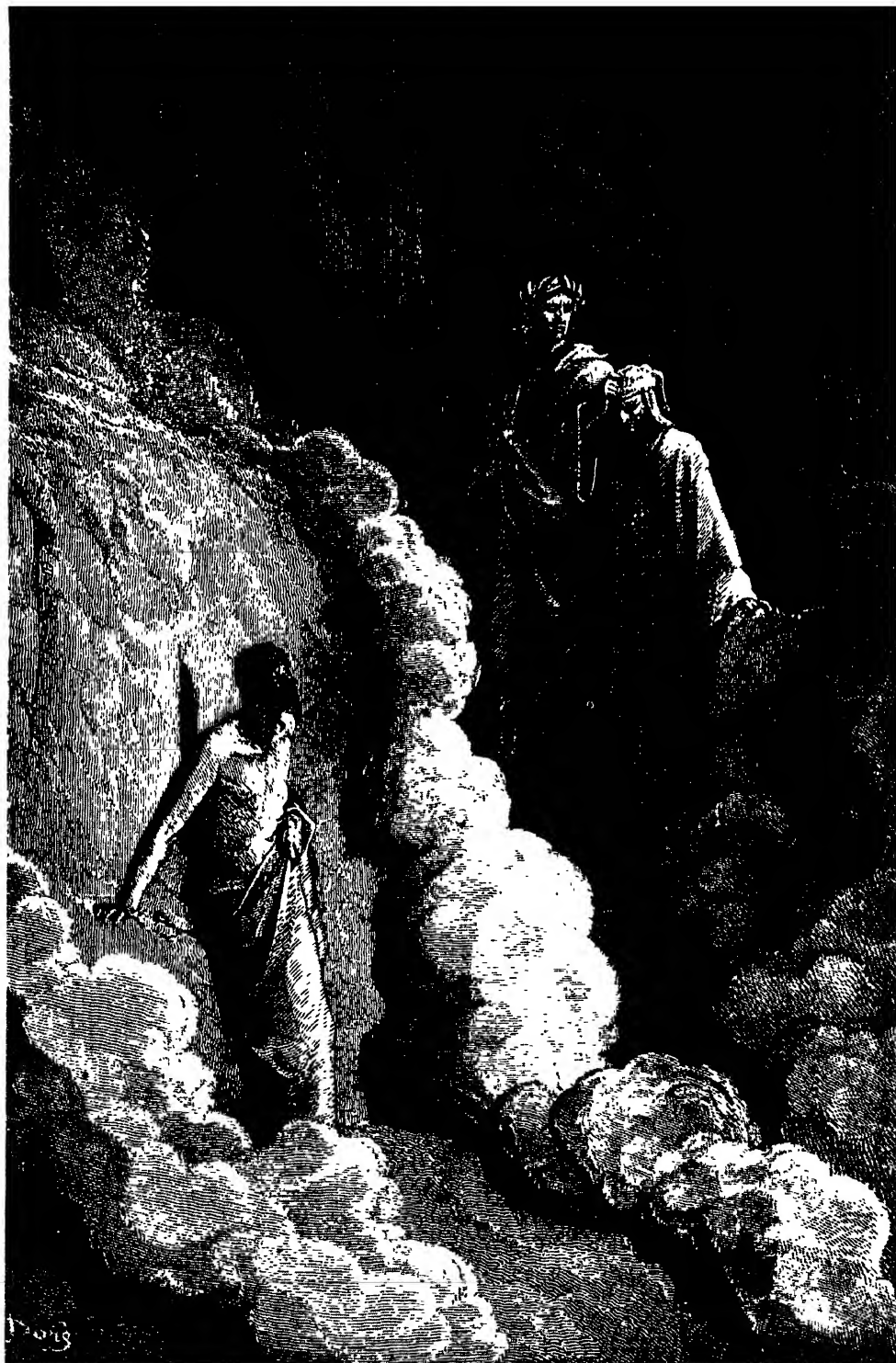
DANTON, *dahN toN'*, GEORGES JACQUES (1759-1794). "Ah, better be a poor fisherman than meddle with the government of men!"

Such was the sad and bitter comment of this dynamic leader on his own efforts in connection with the French Revolution.

Danton was born at Arcis-sur-Aube, of middle-class parents. At the beginning of the titanic struggle, he was a successful lawyer, practicing in Paris. His first connection with the revolutionary movement was as president of a popular club in his home district. His magnetic and impulsive nature made leadership in his case inevitable.

On the fall of the monarchy, he was immediately placed in the important office of Minister of Justice, an evidence of his standing with the revolutionary party. In the turbulent events which followed, he did his best to serve the cause of liberty, and he did it with patriotic zeal. Yet, in addition to an ardent enthusiasm,

Photo Brown Bros
DANTON



From illustration by Don

Dante's Purgatory. " 'Now who art thou, that through our smoke dost cleave, and speak'st of us' . . .
They met Marco Lombardo."

1823

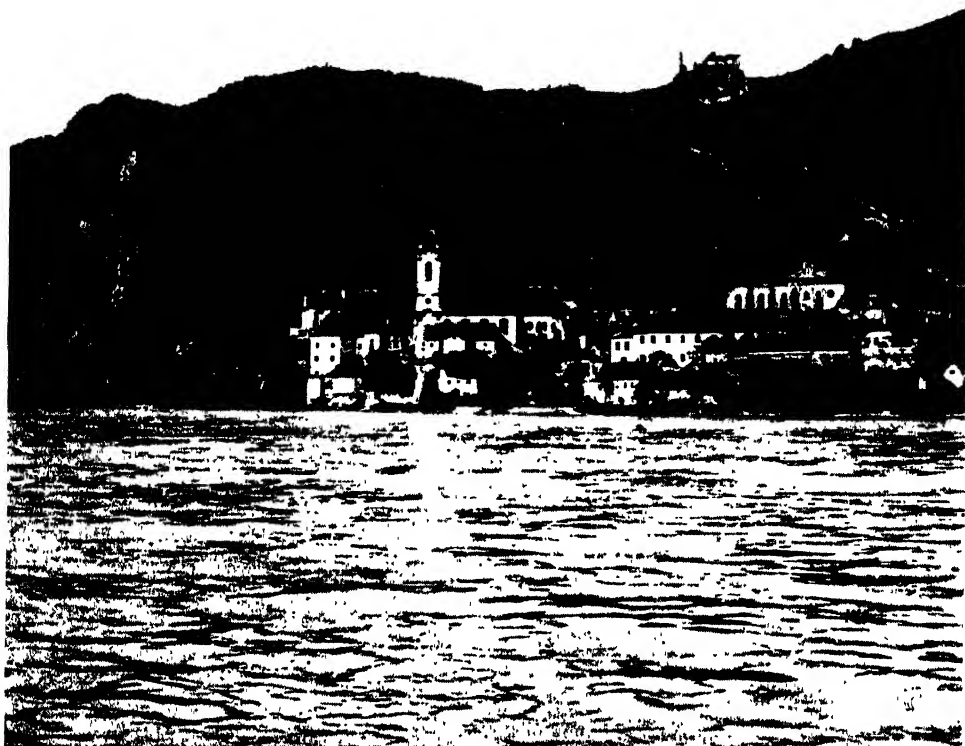


Photo: U & U

ON THE BLUFFS OF THE DANUBE

High on the hill back of the village are the ruins of the building in which Richard the Lion-Hearted was imprisoned. See RICHARD (I, England).

he possessed practical judgment and steadfastness of purpose, which are seldom found combined with zeal for reform. He was associated with men like Marat, Robespierre, and others who were extremely radical. He was in sympathy with their immediate purpose—ridding France of the monarchy—but he saw more clearly than they the early need of harmonizing the various factions and establishing orderly government.

Because of this moderation, Danton was soon in disfavor with his own party. The violence everywhere prevalent was not easily transformed. He was arrested and brought before the revolutionary tribunal, where his eloquence and fiery denunciation alarmed the members for their own power. He was immediately condemned and executed, a victim of the very tribunal which he had helped to create.

His verdict on those who had condemned him was: "Not a man among them has an idea of government." In this saying is disclosed his perception of the need of the hour and his concern for the welfare of France.

Although regarded by his associates as relentless and fearless, Danton was no mere

agitator. He was a powerful speaker, with a vibrant voice, and he possessed a rugged personality which dominated his hearers. "Jove the Thunderer" was one of the names his friends used to characterize his effective utterance.

Notwithstanding the difficulty of estimating the services of one who labored in the midst of a chaotic upheaval, history credits Danton with the desire to restore, rather than to destroy, the social structure.

Related Subjects. The reader is referred to the following articles in these volumes:

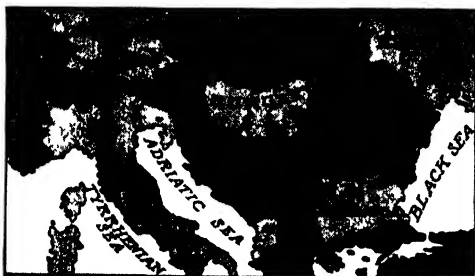
French Revolution
Girondists
Jacobins

Marat, Jean Paul
Mirabeau, Gabriel
Robespierre, Maximilien

DANUBE RIVER. The drainage basin of this great European river, 315,000 square miles in extent, is almost one-tenth the area of the entire continent, and includes Southern Germany, Yugoslavia, Bulgaria, and Rumania. Its waters wash the city walls of Ulm, Ratisbon, Passau, Vienna, Budapest, and Belgrade. Second only to the Volga in length, and the most important water route in Europe, the Danube has its source in the junction of two

small mountain streams of the German Black Forest, which unite at a point 2,187 feet above the sea. It follows a general easterly course, and flows with many a wind and curve before it reaches its outlet on the Black Sea, 1,750 miles from its source. In early days, the Danube was the center of Roman colonization and the scene of inroads of Huns, Magyars, and Avars; it was the highway which brought the Turk westward, and down which he was finally driven in his eastward flight.

Commercial Importance. The Danube is the chief natural route for the commerce of Central Europe, and its value as a commercial highway has been greatly enhanced by extensive improvements made from time to time. At least \$10,000,000 has been appropriated for making navigable the Iron Gate, which is a mountain pass between Hungary and Yugoslavia; commerce through this gap is regulated by an



COURSE OF THE DANUBE

international commission, with headquarters at Galatz. Communication with the Rhine has been established by the construction of the Ludwig Canal in Baden, Germany, and the Sulina channel mouth, at the delta, has been deepened so as to permit the entrance of large ocean-going vessels.

DANVERS, MASS. See MASSACHUSETTS (back of map).

DANVILLE, ILL. See ILLINOIS (back of map).

DANVILLE, VA. See VIRGINIA (back of map).

DANZIG, dahn' tsik. This picturesque old city, with gabled roofs, balconied windows, and other memorials of the past, is the only seaport open to the new Polish republic. From 1793 until the close of the World War, Danzig was a German city and the capital of West Prussia, but by the Treaty of Versailles, 1919, it was placed under the protection of the League of Nations. The Free City of Danzig is now the official name of a territory about 754 square miles in area, embracing 251 rural communes, sixty-three estate districts, and four cities. Of these cities, Danzig proper is the largest, with a population of about 206,500. The district as a whole has a population of 385,000, with Germans greatly predominating.

Lying wedged between Germany and Poland, and facing the Baltic Sea at the mouth of the Vistula River, the territory is popularly known as the "Danzig Corridor." Had the treaty-makers not established this corridor through German territory, the new Polish nation would have had no outlet to the sea for years.

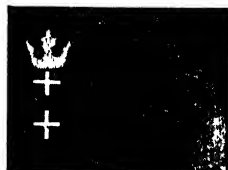
The old city of Danzig has a history reaching back to the tenth century, and is the only large German municipality possessing in marked degree the buildings, paintings, carvings, and monuments of medieval times. In the fine old Protestant Church of Saint Mary's, dating from the fourteenth century, is a famous painting of the *Last Judgment*, supposedly the work of Memling. Other old buildings include the town hall, in Gothic style, and a Franciscan monastery, which is used now as an art gallery and museum.

Though the city is a delight to lovers of the old, its location has made it one of the leading ports of Central Europe, and with its atmosphere of the past there is mingled the bustle and stir of a modern shipping center. Situated at the mouth of the Vistula River, about three miles from the sea, Danzig is connected by waterways and railroads with the great timber, grain, and beet-sugar districts of Germany, Russia, and Poland. Naphtha and coal are other important exports, and the city has large shipbuilding yards, and steel mills, distilleries, flour mills, and sugar refineries.

At the close of the World War, Poland asked that the city be ceded to the new Polish republic, but the treaty-makers decided against this proposal, because the population of Danzig is ninety-six per cent German. According to final arrangements, the Free City of Danzig is an independent country under the protection of the League of Nations, which appoints a high commissioner to decide points of difference between Poland and the district. A constitution, approved by the League in 1922, provides for the election of a legislative assembly of 120 members, and a senate of twenty-two, including a president and a vice-president. Poland has special economic rights in the district, and the two are in a single customs union. See POLAND; WORLD WAR.

E.D.F.

[Not satisfied to benefit from a seaport not wholly under its control, Poland began in 1928 to develop a new port on its own territory, northwest of Danzig. The village of Gdynia, a fishing port, was chosen as the new Polish maritime center, and vast port developments were at once inaugurated.]



FLAG OF DANZIG

Red background;
yellow crown, white
crosses.

DAPHNE, *daf' ne*, in classic myths, the daughter of the river god Peneus; she was a beautiful nymph who delighted in woodland sports and hunting.

Daphne desired to remain unmarried, like Diana, but her beauty brought many lovers. Apollo, especially, pierced by a golden arrow from Cupid's bow, was filled with love for her. But she, pierced by Cupid's leaden arrow, abhorred the thought of loving. One day Apollo chased Daphne through the woods, and when her strength failed, she called on her father to change her form. Immediately she was changed into a laurel tree, and ever after the laurel was sacred to Apollo. He wore a wreath of its leaves as a crown; since then laurel wreaths have been symbols of honor and merit. See **LAUREL** (The Laurel in Legend).



APOLLO AND DAPHNE
Statue by Bernini, in the
Villa Borghese, Rome

DAPHNIA, *daf' ne ah*, OR **WATER FLEA**, a very tiny fresh-water crustacean, which moves through water in skips and jumps, like a flea, using its feathery feelers (antennae) as oars. The body of this microscopic animal is encased in a transparent hinged shell of chitin. The head is prolonged into a snout and is provided with feelers and a single, central compound eye, formed by the fusion of a pair of lateral eyes. There are five pairs of appendages, which move continually, aiding the animal's breathing. Some water fleas change color in summer, owing to the presence of eggs or young. Swarming in millions in ponds and marshes, they impart color to the water. S.H.S.

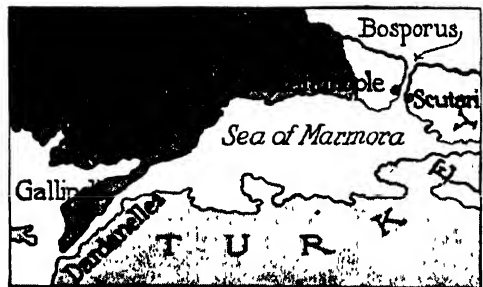
DARDANELLES, *dahr da nelz'*. European nations have long recognized the fact that any one nation which controlled both of the straits leading to the Black Sea, and the sea itself, could build and assemble a war fleet which would be practically safe from attack and yet have all the maritime nations of Europe at its mercy.

The Dardanelles is a strait connecting the Aegean Sea with the Sea of Marmora, which in turn, at its eastern extremity, is connected by the Bosphorus (which see) with the Black Sea. The two straits, together with the Sea of Marmora, form a waterway leading from the land-locked Black Sea to the Mediterranean Sea.

The Dardanelles is a narrow channel, easily defended, and is recognized as the keystone which hitherto long held together the Turkish Empire. Its importance has frequently been proved in the history of Turkey, but never more clearly than in 1915, during the World War. For almost a year, allied armies and fleets attempted to force a passage to Constantinople, only to retire at last, after making heavy sacrifices. The power which holds the straits inevitably holds Constantinople, and when, in 1920, the Dardanelles was internationalized—opened to all—the Turk's power in Europe was broken.

At its narrowest point the Dardanelles is only one mile wide from the European to the Asiatic shore. Its average width is three to four miles, and it is about forty-seven miles long. The channel has an average depth of less than 200 feet. Except when the wind is blowing eastward across the Aegean Sea, the Dardanelles has a strong outward current, but a powerful undercurrent flows in the opposite direction, and is constantly carrying a supply of salty water through the Dardanelles, the Sea of Marmora, and the Bosphorus into the Black Sea. It is this undercurrent which keeps the Black Sea from gradually becoming a fresh-water body.

In History. Almost from the dawn of history, the Dardanelles has been of strategic importance, and has constantly figured in wars



THE DARDANELLES

and in peaceful negotiations. Near Abydos, later the scene of Leander's and Byron's exploits, Xerxes crossed into Europe with a great army in 481 B.C., and here, too, Alexander led his forces across a great bridge of boats in 334 B.C. Centuries later, the strait, or more properly, Constantinople, became the heart of the Byzantine Empire, and it was not until the Turks were in absolute command of the Dardanelles that the empire was doomed.

After the fall of the empire, in 1453, the Turks remained absolute masters of the Dardanelles. In 1807 a British fleet forced its way through to Constantinople, which up to that time had never seen a hostile fleet. In 1841 the five great powers of Europe—Great Britain,

France, Russia, Prussia, and Austria—agreed with Turkey that no foreign man-of-war should pass the Dardanelles without Turkey's special permission. This agreement was renewed in 1856, after the Crimean War, and again in 1871 and in 1878.

For many years it was Russia's announced intention to secure a change in this policy, and if possible, to secure for itself the control of the strait, that it might have access to the sea from ports that were never frozen. It did not succeed. After the World War, by the Treaty of Lausanne between Turkey and the Allies, signed in 1923, it was agreed that the strait should remain open to all nations.

In Myth and Story. To the ancient Greeks the channel was known as the *Hellespont*, that is, Sea of Helle, in honor of Helle, daughter of Athamas, a king in Boeotia, and the goddess Nephele, or Cloud. Athamas later married Ino, a mortal, who planned to sacrifice Phryxus, brother of Helle, to the gods. Nephele saved her children by giving them the ram with the golden fleece, but as they were crossing the strait between Europe and Asia, Helle fell from the ram and was drowned. The fleece of this ram was afterward sought by Jason and the Argonauts (which see).

Another famous legend is that of Hero and Leander. Near Abydos, where the strait is about 6,500 feet wide, Leander is said to have swum across each night to see Hero, and in modern times the poet Byron, in emulation, accomplished the same feat in one hour and ten minutes. See **HERO**.

Just when the name *Dardanelles* began to take the place of *Hellespont* is uncertain. The word is derived from the ancient Greek city of Dardanus, on the Asiatic side of the strait. The city, according to legend, was built by a hero of the same name, a son of Zeus and Electra. This hero became the founder of the race of Dardani, and was the ancestor of Aeneas.

Related Subjects. The reader is referred in these volumes to the following articles

Bosporus	Hero
Constantinople	Lausanne, Treaty of
Crimea (Crimean War)	Marmora, Sea of
World War (Dardanelles Campaign)	

DARE, VIRGINIA (1587-?), the first white child born on the American continent, around whose name grew up one of the few legends of the early days of the colonial period. She was the daughter of Ananias and Eleanor White Dare, members of a band of 121 colonists sent to Virginia by Sir Walter Raleigh in 1587, and was born on August 18. Two days later, the infant was christened Virginia—the first known celebration of this Christian sacrament in America. In addition to the above, all that is known of her centers around the legend of the "Lost Colony." See **VIRGINIA** (History).

The Lost Colony of Virginia. Sir Walter Raleigh made several attempts to colonize the new country of Virginia, a vast undefined territory in America, named for Elizabeth, England's "Virgin Queen." One colony which, it was hoped, would prove successful left

England on April 9, 1585; 108 men were in the company. Threatened by the possibility of famine and by hostile Indians, the colony within a year returned



Photo. Wide World

VIRGINIA DARE MONUMENT

On the spot where Sir Walter Raleigh's colonists built a fort on Roanoke Island. The inscription reads as follows:

On this site, in July-August, 1585, (O. S.), colonists, sent out from England by Sir Walter Raleigh, built a fort called by them

"THE NEW FORT IN VIRGINIA."

These colonists were the first settlers of the English race in America. They returned to England in July, 1586, with Sir Francis Drake.

Near this place was born on the 18th of August, 1587, VIRGINIA DARE,

the first child of English parents born in America—daughter of Ananias Dare and Eleanor White, his wife, members of another band of colonists sent out by Sir Walter Raleigh in 1587.

On Sunday, August 20, 1587, Virginia Dare was baptized. Manteo, the friendly chief of the Hatteras Indians, had been baptized on the Sunday preceding. These baptisms are the first known celebrations of a Christian Sacrament in the territory of the thirteen original United States.

to England on the ships of Sir Francis Drake. Only a few days after their departure, more colonists and needed supplies arrived from the mother country.

Though greatly disappointed over the abandonment of the preceding enterprise, fifteen hardy adventurers remained when the second fleet returned home. See **RALEIGH, SIR WALTER**.

The next year (1587) Raleigh dispatched another company of 121 persons, under John White, who was instructed to remove the settlement to the shores of Chesapeake Bay. Arriving at Roanoke Island, they were obliged to remain there, for the sailors refused to carry them farther. Of the fifteen persons they expected to greet on their arrival, which was on July 22, not one was found alive. Twenty-seven days later (August 18), a granddaughter of White was born, and she was christened Virginia Dare. White returned to England for supplies and was detained there until 1591.

Upon his belated return, he found no trace of the colony except the word "Croatan," carved on a tree. It had been agreed that if another location were sought, the name of the new place would be thus indicated. It was assumed that the colonists had gone into the interior in the company of friendly Indians, but they were never found. This belief regarding their movements is fortified by the fact that in Robeson County, on the southern boundary of the state, there is to-day a mixed people with Indian habits and occasional English names, calling themselves Croatans. The connection between the colonists and this present-day group is not at all certain, however. The places named are not in the present-day Virginia, as may be supposed, but in North Carolina.

The arrival of the colonists, the birth and baptism of Virginia Dare, the return of Leader White, and the finding of the word "Croatan" are the only facts that compose the record of the colony.

The Legend. Tradition carries the story along, and declares that among friendly Indians Virginia grew into a beautiful girl. A bit of pure imagination enters also, for Indian superstition relates that she was changed by the sorcery of a rejected lover into a white doe, which lived a charmed life; true love finally triumphed over magic, and she was restored to human form, only to die when shot by the silver arrow of a cruel chieftain. Of course, nobody believes all of this tale.

It was in Dare County, of which Roanoke Island is a part, that white men first learned of the solace of pipe tobacco, and it is also known as the place where the Irish potato entered the diet list of civilized man. E.D.F.

DAR-ES-SALAAM, *dahr es sa lam'*, capital of Tanganyiki Territory (which see).

DARFUR, *dar foor'*, the most westerly division of the Anglo-Egyptian Sudan, in East Central Africa; French Equatorial Africa lies on the west. It covers an area of 150,000 square miles and consists chiefly of a vast plateau nearly 3,000 feet above sea level. The inhabitants, numbering about 1,000,000, are negroes and Arabs, whose chief occupations are agriculture and raising cattle. Ostriches are also bred, and their feathers are an important item of commerce. The climate is fairly healthful, except in the rainy season, which lasts from June to September. There are no rivers, but instead there are many small water courses, which are filled with raging torrents

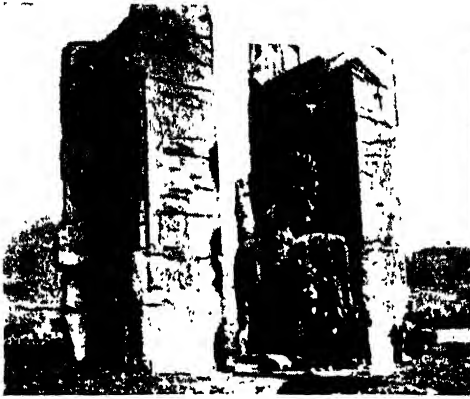
during the rains. Copper, iron, and salt are produced, and the mineral wealth of the country is great. The capital is El Fasher, a town with a few buildings in European style, but consisting principally of straw-covered huts. See **ANGLO-EGYPTIAN SUDAN**.

DARIEN, *da ri en'*, a gulf forming part of the Caribbean Sea, located between the republics of Colombia and Panama, on the north coast of South America. A southern extension of this body of water is called the Gulf of Uraba. The name Darien has also been given to the department of Panama bordering on Colombia, and it was formerly applied to the strip of land now called the Isthmus of Panama. The isthmus was reached by Columbus on his fourth voyage, in 1502, and was an early field for Spanish exploration and settlement. It was crossed in 1513 by Balboa, governor of the Darien settlement, who from its highest point discovered the Pacific Ocean. The first settlement was that of Santa Maria del Antigua, situated on the small Darien River, northwest of the Atrato.

Darien Scheme, a gigantic project launched in 1695 by William Paterson, a Scotsman and first projector of the Bank of England, to establish a colony and commercial center on the Darien isthmus near Panama, in order to gain trade for Scotland. European manufactures were to be sent to the Gulf of Darien and conveyed by land across the isthmus, where the products of South America and Asia were to be exchanged. Nearly \$4,000,000 was subscribed, although a considerable portion of it was never paid, and in 1698 five vessels laden with merchandise and provisions, with 1,200 persons, sailed from Leith, the Scottish port, for New Caledonia, the name given to the new Darien settlement. The climate proved unhealthful, the Spaniards attacked the defenseless colony, the English colonies of America disapproved, and after a period of eight months, the colonists were compelled by disease, famine, and persecution to return to Europe. Paterson lost his reason for a time, but later recovered. Two succeeding attempts at Scottish colonization failed, and in 1706 the lords commissioners for England purchased the shares of private individuals of the Darien Company, to bring about a better understanding between Scotland and England.

DARIUS, *da ri' us*, the name of the three greatest monarchs in the long history of Persia. Only two of them are of interest to-day.

Darius I (558-485 B.C.) was one of the most notable rulers the East has ever produced; for he was distinguished as a statesman, as a warrior, and as an organizer. The record of his achievements, which he had carved in cuneiform writing on a lofty cliff known as the Behistun Rock, in Western Persia, states that in the year 521 B.C. he slew Gautama, who had usurped the Persian throne on the death of Cambyzes, and made himself ruler of Western Asia and Egypt. After putting down revolts in various parts of his empire, he devoted himself to the arts of peace. The Persian realm was divided into *satrapies*, or provinces, with a governor over each; a magnificent system of



Photos. O. R. O. G.

FROM THE DAYS OF DARIUS THE GREAT

Portals of the ancient palace of Darius at Persepolis, as they stand to-day, about thirty miles northeast of modern Shiraz. The palace was burned by Alexander the Great about one hundred fifty years later. At the right is the present-day appearance of the tomb of Darius.

post roads was built, and a national coinage was provided.

During his reign, Darius undertook several wars, mainly for the purpose of strengthening the boundaries of his empire and of holding in check the barbarous tribes on the frontier. He conquered the Punjab, in Northwestern India, but was unsuccessful in a war against the Scythians. In 490 B.C. a great army under Darius was defeated by the Greeks at Marathon, during the memorable Persian invasion of that year. In 480 B.C., while he was preparing to send another army to Greece, and when Egypt was in revolt, Darius suddenly died.

Darius III came to the throne in 336 B.C., at a time when the kingdom was in a state of decline. Philip of Macedon had already begun offensive warfare against the Persians, and the campaign was renewed in 334 B.C. by his son, Alexander the Great. Darius took the field in person against the great conqueror, and was totally defeated at Issus in 333 B.C., and at Arbela two years later. In 330 B.C. he was deposed and killed.

Related Subjects. The reader is referred in these volumes to the following articles.

Alexander the Great	Marathon
Cuneiform Inscriptions	Persia (History)

DARK AGES, the name given to a period in the history of the world, of about 700 years' duration, between A.D. 475 and 1137. It was so called because it was overshadowed by the splendor of the Roman Empire during the period immediately before, and by the wonderful culture and force of the Revival of Learning (see **RENAISSANCE**) which followed. During the Dark Ages, the civilization of the world neither slipped back nor was at a standstill, as many believe, except in the field of architecture. Just as dead-looking trees prepare through winter for a season of fruit and flowers, so were powerful influences working through the Dark Ages for a period of splendor and advancement. See **MIDDLE AGES**.

DARK CONTINENT, a name popularly applied to Africa, but now of less significance than formerly, since even the less accessible sections are better known. See **AFRICA**.

DARKNESS AND DAYLIGHT. See **ARCTIC CIRCLE**.

DARLING, JAY NORWOOD (1876-), familiarly known as "Ding" from the signature which appears on his drawings, is one of America's leading cartoonists. While nominally attached to the staff of the *Des Moines Register*, his cartoons after 1917 were widely syndicated through the *New York Tribune* and were probably enjoyed by more than a million people daily. They portray national events and the foibles of humanity, always with a vein of humor that carries an irresistible appeal.

"Ding" was born in Norwood, Mich., was educated at Yankton (S. D.) College and Beloit (Wis.) College, and upon graduation became a newspaper reporter, at the same time developing his artistic tendency. His first position as cartoonist was on the *Sioux City Journal*, in 1901.

DARLING RIVER. See **MURRAY RIVER**; **AUSTRALIA** (Rivers and Lakes).

DARMSTADT, *darm' shtat*. See **GERMANY** (Principal Cities).

DARNEL. See **TARE**.

DARNLEY, HENRY STUART (1545-1567), second husband of Mary, Queen of Scots (see **MARY STUART**). His mother, Lady Margaret Douglas, was a niece of Henry VIII; his father was the Earl of Lennox. Darnley was devoid of moral and intellectual force, and this may account for his life of profligacy, which plunged him into licentiousness and intemperance. Goaded by jealousy, he caused the murder of David Rizzio, his wife's secretary, and he made the deed more horrible by forcing

her to witness it; Mary's abhorrence of him was thereby intensified. Darnley met his death when a house which sheltered him was destroyed by an explosion believed to have been instigated by James Bothwell. What part Mary may have had in this act, if any, will never be known, but three months later she married Bothwell.

DARTER, SNAKE BIRD, OR WATER TURKEY,

a beautiful, web-footed bird of tropical and sub-tropical America, related to the cormorant (which see). This bird is about threefeet long, with glossy black plumage and silvery markings on the back of the neck and wings. The tail is broad and brown-tipped; the bill

is olive above and yellow below; the feet are olive with yellow webs. Darters perch on trees by the water side, and after hovering an instant over the water, dart at their fish prey, follow it under water, spear it with the sharp bill, and, coming above water, toss the fish in the air to catch it for eating. Their necks are long and snakelike, and suggested the second name above. There are other species in Africa, Southern Asia, and Australia. D.L.

Scientific Name. Darters constitute the family *Anhingidae*. The American species is classed as *Anhinga anhinga*.

DARTMOUTH COLLEGE, at Hanover, N. H., among the oldest and most notable of American colleges, is the outgrowth of a charity school for poor Indians. The Indian school was established in 1754 at Lebanon, Conn., but in 1770 was removed to Hanover. Meanwhile, its friends had raised an endowment fund, and it had been decided to admit whites as well as Indians. The endowment was placed in the hands of a board of trustees, of which William, the second Earl of Dartmouth, was chairman. A large tract of land in New Hampshire was given to the school, and in 1769 King George III signed a charter for Dartmouth College, named in honor of its chief patron. The school began its existence in log huts in the midst of a wilderness, and the first permanent building, Dartmouth Hall, was not completed until 1791. The Revolutionary War put an end to most of the support from England, but gradually the attendance and endowment were increased.

The college has grown from those humble colonial beginnings until now it has an annual

enrollment exceeding 2,000, and about 200 instructors. It confers degrees in arts, letters, science, civil engineering, and medicine.

Many distinguished men are numbered among the graduates of Dartmouth, including three eminent statesmen—Daniel Webster, Thaddeus Stevens, and Salmon P. Chase.



THE DARTER

In this picture, the bird is interested in something behind him.

1 hour Wide World

Dartmouth College Case, one of the most important cases ever decided by the Supreme Court of the United States. The court held that a charter granted by a state was a contract, and that any attempt by the state to alter it was unconstitutional because "no state shall . . . pass any . . . law impairing the obligation of contracts" (Constitution of the United States, Art.

I, Sec. 10). The case arose from a religious and political struggle for the control of the college. The state legislature had amended the charter by adding eleven new trustees, for the purpose of outvoting the old members of the board, but the latter, with Daniel Webster (a Dartmouth graduate) for attorney, carried the case to the Supreme Court, and won. The decision was handed down by Chief Justice Marshall in 1819.

DARWIN, CHARLES ROBERT (1809-1882). This English naturalist won imperishable fame as the formulator of the theory of evolution (which see). In his epoch-making work, *The Origin of Species by Means of Natural Selection*, published in 1859, he outlined the facts on which his conclusions were based, and marshaled the evidence for evolution in a masterly way. The book created a sensation, and a storm of controversy at once arose. The first edition was exhausted on the day it was published. Darwin's career shows the power of hereditary influence, for his grandfather, Erasmus Darwin, was a naturalist of some distinction, and his father, Robert Waring Darwin, was a fellow of the Royal Society. His mother was the daughter of the famous Josiah Wedgwood, distinguished as a manufacturer of pottery.

Charles Robert was educated at the University of Edinburgh, and at Christ College, Cambridge, where he was graduated in 1831. His father had hoped to see his son become a clergyman, but the young man's liking for natural history overshadowed other interests, and not long after his graduation he eagerly accepted an offer to sail with the British surveying expedition on the steamship *Beagle*, in the capacity of naturalist. The expedition

made a five-years' tour of the world (1831-1836); it afforded Darwin an extraordinary opportunity for original research and study of plant and animal life, and gave him the basic ideas upon which he built his theories of evolution.

On his return to England, he began the preparation of a series of important scientific works, culminating in 1859 in his *Origin of Species*. Up to this time, it had been generally believed

that each kind of animal was descended from a like species, that dogs had always been dogs, and tigers had always been tigers, and that the division of the animal kingdom into species was due to special acts of creation. But Darwin's explanation of the origin of species was based on the law of natural selection (which see), or the survival of the fittest. That is, in the plant and animal world, vast numbers of individuals are produced, but in the struggle for existence, only the strongest, or "fittest," survive. The special qualities are inherited which make these individuals superior to those that perish; the next generation starts from a higher plane, and so on through successive generations. A continuation of this unconscious selecting process accounts for the peculiarities of the existing species; the result of the selective process he called "perfect adaptation." This adaptation theory is of fundamental importance in the scheme of evolution.

In 1871 Darwin gave to the world a second epoch-making book, *The Descent of Man*, in which he extended his theory to include the human race. Though at the time he brought upon himself the severe criticism of those who interpreted as actual fact the Bible story of the Creation, yet since his death the underlying principles of evolution as applied to man have come to be generally accepted by scientists.

The later years of the great naturalist were devoted to the elaboration of his theories, and though he labored under the worst of handicaps—continual ill-health—his perseverance and industry bore fruit in a remarkable list of publications. He was buried in Westminster Abbey.

What He Wrote. In addition to the books already noted, Darwin gave to the world *Fertilization of Orchids*, *Expression of the Emotions in Man and Animals*, *Different Forms of Flowers in Plants of the Same Species*, and *The Power of Movement in Plants*.

DASKAM, JOSEPHINE DODGE. See BACON, JOSEPHINE DODGE DASKAM.



Photo. Brown Bros.

CHARLES DARWIN

DATE AND THE DATE PALM. In the hot, dry lands of deserts and caravans, and in the land of pyramids and mummies, grows that stately tree which so constantly appears in poetry and proverbs of the East, the *date palm*, the palm tree of Scripture. On that tree, at a distance of fifty, sixty, or even a hundred feet from the ground, grow golden bunches of a fruit which for many centuries has been one of the principal articles of food for the brown-skinned peoples of the lands of Northern Africa and Southwestern Asia. The date palm is probably the oldest cultivated tree known to history; directions for its culture are recorded on sun-baked bricks made over 5,000 years ago in Mesopotamia. The tree is also cultivated in China, Spain, France, and Italy, and to some extent in the Southwestern United States.

Next to the coconut palm, the date palm is without doubt the most interesting and useful of the palm family. The tall, straight stem, nearly the same thickness throughout its length, throws from its summit a magnificent crown of large, feather-shaped leaves which have been used in the religious services of pagans, Jews, and Christians from earliest times. There, too, appear the inconspicuous flowers, male and female on separate trees. Later, if fertilization has been secured by placing a bunch of pollen-bearing blossoms in the tree with the female flowers, the flower stalks bear twenty- to twenty-five-pound bunches of from 180 to 200 dates.

These palms begin to bear from six to ten years after planting, and a single tree produces from 100 to 600 pounds of fruit a year, bearing for a century or more. Date palms require a very hot, dry climate having an average temperature of 90° F. for three months of the year. A sandy, alkaline soil is satisfactory. Plenty of water must always reach the roots, so irrigation and artesian wells are made use of, for the fruit will not ripen unless the summer season is rainless. In Algiers there is an oasis where the trees are grown in deep pits dug in the soil, so that the roots may reach the moisture far below the surface.

The Fruit. Although it is a light golden color when on the tree, most people know the date in its dried form as an oblong, fleshy, sweet fruit about two inches long, deep russet in color, containing a hard, oval seed with one deep furrow. Dates are eaten either fresh or dried. Cakes of them pounded and kneaded together are the food of the Arabs who traverse the deserts.

As the food value of dates is high, their nutritive qualities being equal to those of wheat and corn flour, efforts have been made to cultivate date palms in the United States. The area devoted to commercial date culture is limited to such regions as the Salton Basin and hot interior valleys of Central California;



The Date Palm. Picking dates in an Egyptian oasis. The lower branches are cut away each year, leaving steps which, with the aid of a rope, enable the pickers to climb the trees with ease. In the insert is shown a typical date cluster.

Photos: O R O C

the valley of the Colorado River to the Nevada boundary; the lower Salt and Gila river valleys in Arizona; and a small portion of the lower Rio Grande Valley in Texas. California and Arizona are both producing good varieties of dates in commercial quantities, but as yet the American market depends chiefly on importations.

Uses. Besides the food value of the fruit, there are a number of other economic values credited to the date palm. A liquor resembling wine is made from dates by fermentation. The trunk of the tree and other parts are used for fuel and in the construction of fences, etc. The leaves are used for matting, baskets, and bags; the fiber, in making rope. The buds are eaten as a vegetable. When roasted, the fruit stones are used as a substitute for coffee, and when ground, they yield an oil. When the oil has been extracted, the remaining substance is valued as food for cattle. See PALM. B.M.D.

[The botanical name of the date palm is *Phoenix dactylifera*]

DAUDET, do deh', ALPHONSE (1840-1897), a French author and dramatist, famous because of his keenness of observation and ability to write what he saw. In his younger days, he was deprived of the pleasures most boys enjoy, and at the death of his father he went to the college of Alais, a little town of the Cevennes, where he worked and studied, later becoming a tutor. He was unhappy in this vocation, and in 1857 he abandoned it and took refuge with his brother Ernest, who was earning \$15 monthly by writing for newspapers in Paris. This sum supported the brothers until the dawn of brighter days.

When he was eighteen, Alphonse published *Les Amoureuses*, a small volume of poems which gave him some recognition in the literary world and soon led to appointment as private secretary to De Morny, half brother of Napoleon III. About this period, he dramatized *Numa Roumestan* and wrote several plays. Throughout his literary career which followed, he was given help and inspiration by his wife, whom he married in 1867.

Other Works. In 1868 he issued *Le Petit Chose* (*The Little Chap*), an autobiographic novel. His best and most enduring novels were written during the following fourteen years, and include *Jack*, *The Nabob*, *L'Evangeliste*, *Tartarin on the Alps*, and *Sapho*. The latter, the best known of his works and probably

the one of lowest moral tone, yet teaching a striking lesson, he considered his masterpiece. *Sapho* has become known through its dramatization to thousands of people who never read one of Daudet's books.

DAUGHTERS OF REBEKAH. See ODD FELLOWS; COLFAX, SCHUYLER.

DAUGHTERS OF THE AMERICAN REVOLUTION, a patriotic society of women, organized in Washington, D. C., in 1890. Its objects are set forth in its constitution, as follows:

(1) To perpetuate the memory and spirit of the men and women who achieved American independence, by the acquisition and protection of historical



Photo. U & U

Building erected and owned by the Daughters of the American Revolution, in Washington, D. C. It is called Memorial Continental Hall.

spots, and the erection of monuments; by the encouragement of historical research in relation to the Revolution, and the publication of its results; by the preservation of documents and relics, and of the records of the individual services of Revolutionary soldiers and patriots, and by the promotion of celebrations of all patriotic anniversaries.

(2) To carry out the injunction of Washington in his farewell address to the American people, "to promote, as an object of primary importance, institutions for the general diffusion of knowledge," thus developing an enlightened public opinion, and affording to young and old such advantages as shall develop in them the largest capacity for performing the duties of American citizens.

(3) To cherish, maintain, and extend the institutions of American freedom, to foster true patriotism and love of country, and to aid in securing for mankind all the blessings of liberty.

Any woman is eligible for membership who is not less than eighteen years of age, and who is

descended from a man or woman who, with unflinching loyalty to the cause of American independence, served as a sailor, or as a soldier, or civil officer in one of the several colonies or states, or in the united colonies or states, or as a recognized patriot, or rendered material aid thereto; provided the applicant is personally acceptable to the society.

In the city of Washington, the society owns beautiful Memorial Continental Hall, completed in 1910, and an administration building, which is used for executive offices. There is an active membership exceeding 165,000, in 2,250 local chapters. The chief officer is styled president-general. G.H.B.

DAUPHIN, *daw' fin*, the official title of the eldest son of the king of France before the Revolution of 1830. The name, which means *dolphin*, belonged originally to the lords who ruled the province of Dauphine, and was adopted as their title because of three dolphins worn on their helmets. The last lord, who had no children, ceded his province to Charles of Valois, the grandson of the French king, with the provision that the heir to the French throne should always be called the Dauphin of Vienne and should rule the province. At first, the dauphin had many privileges as ruler of his domain, but later, when it was put under the same rule as all other provinces, the title became merely honorary.

DAVENPORT, *dav' en port*, IA., the county seat of Scott County, ranking third among Iowa cities in population, following Des Moines and Sioux City. It is situated in the eastern part of the state, on the Mississippi River. Chicago is 169 miles east, and Des Moines, the capital, is 175 miles west.

Davenport lies on a picturesque bluff near the foot of the Rock Island Rapids of the Mississippi River, and commands a fine view of the river and Rock Island, with which it is connected by a double-deck government bridge, toll-free. This thousand-acre island is owned by the United States government, and upon it has been built an arsenal which represents an investment of 48 million dollars. Davenport and the two cities in Illinois just across the river, Moline and Rock Island, are known as the Tri-Cities.

In 1835 a company headed by Colonel George Davenport purchased the present site of the city. It was incorporated as a town in 1838, and a city charter was granted in 1851. The prevailing nationality among the original foreign element is German. Population, 1925, 52,469 (state census).

Industries. Davenport has diversified industries, the products manufactured including railroad cars, agricultural implements, wheels, washing machines, locomotives, ready-cut houses, cement, cereals, bakery products, flour, foundry products, clothing, pearl buttons, cigars, and candy.

Transportation. Railroad lines entering the city are the Chicago, Rock Island & Pacific; the Chicago, Milwaukee, Saint Paul & Pacific; the Chicago, Burlington & Quincy; the Clinton, Davenport & Muscatine, and the Davenport, Rock Island & Northwestern. A belt-line railroad serves the Tri-Cities. Motorbus lines are numerous, and the Inland Waterways Corporation furnishes barge service north to the Twin Cities of Minnesota and south to New Orleans.

Institutions. These include Saint Ambrose College, Saint Katherine's Academy for Girls, Immaculate Conception Academy, Palmer School of Chiropractic, the Davenport Museum, the Municipal Art Gallery, and the public library. Three of the city's social-service institutions, the Friendly House, the Lend-a-Hand Club, and the Davenport Visiting Nurses Association, are housed in commodious buildings.

DAVID, KING OF ISRAEL (1041-970 B.C., Biblical chronology). David was a shepherd lad, the youngest son of Jesse, the Bethlehemite. He had seven brothers, all strong, brave men, but David

is spoken of as "having a beautiful countenance, and goodly to look upon." The Lord directed the prophet Samuel to go to Bethlehem and pour oil on David's head to indicate that he was set apart to become king of Israel. Samuel did as he was directed, "and the spirit of the Lord came mightily upon David from that day forward"; but David returned to the care of his flocks, all unconscious of his future responsibilities and greatness.



DAVID

From the statue by Michelangelo, in Florence, Italy.

David and Goliath. David was about sixteen when he was anointed by Samuel. When he was about twenty, a war broke out between the Israelites and the Philistines, and David's brothers joined the army of Saul, the king of Israel. One day Jesse told David to take some food and clothing to his brothers. He found the two armies arranged on the opposite sides of a valley, ready for battle. For forty days the armies had held this position, and each day a giant of the Philistines, Goliath by name, came forth into the valley and taunted the Israelites to send a man to fight with him, saying that if the Israelites killed him, then the Philistines would be the servants of Saul, but if he killed the Israelite, then Saul's army would become servants of the Philistines.

The Israelites were sorely troubled, for no one in all Saul's army dared fight Goliath on

those terms. Then David came. He made a few inquiries about this boastful giant who defied the armies of the living God, and volunteered to accept his challenge. Having obtained Saul's consent, he ran into the valley in his simple shepherd's garb, with only his staff and sling for weapons. Goliath was clothed in heavy armor and carried a sword and a spear. David ran to the brook and picked up a few smooth stones for his sling. He was then ready for the conflict. In breathless amazement the two armies looked upon the young shepherd, for, placing a stone in his sling, he hastened to meet his foe. When he reached the proper distance, David stopped and hurled a stone, which struck Goliath in the forehead with such force that even his armor was no protection against it, and he fell to the ground. David then drew the giant's sword and cut off his head and brought it to Saul. The Philistines fled in dismay. David had won a great victory for Israel.

David and Jonathan. Jonathan was Saul's eldest son, and he and David became fast

friends. Jonathan loved David as he loved his own soul. David was a sweet singer and a skilful player on the harp. He was a brave soldier as well, and after he killed Goliath, he remained with the army. He soon became a commander, and wherever he went he led his forces to victory. He was very popular with the soldiers and with the people, but Saul was of a melancholy disposition and often gave himself up to fits of sadness. On these

occasions he frequently sent for David to sing and play upon the harp, to drive away his gloomy spirits. Once when David was returning from a great victory over the Philistines, he was given a rousing reception by the people and the women sang—

Saul hath slain his
thousands,
And David his ten
thousands.

This made Saul so angry that he determined to take David's life. From this time until Saul's death, David was obliged to live in another country to escape Saul's anger. During all those years, Jonathan stood between his father and David, in whose behalf he once risked his life in defending David before the king. Finally, in the Battle of Gilboa, the Israelites were sorely defeated by the Philistines. Jonathan was slain, and Saul was so severely wounded that he took his own life. David said of Jonathan—

Thy love for me
was wonderful,
Passing the love of
women.

David as King. After the death of Saul, David became king of Judah, and had his capital at Hebron. For several years there was war between



DAVID WITH THE HEAD OF GOLIATH

Quaint old concept of the Bible story, painted by Strigel (1451-1528). Medieval artists did not consider it necessary to portray historical events in surroundings and in costumes that were contemporary.

the forces of David and the forces of Saul, who were now under the leadership of Abner. But the forces of David grew stronger, while the forces of Saul became weaker, and after seven years of struggle, David became king of all Israel. He established his capital at Jerusalem, which became the "City of David."

As king, David gave his attention first to conquering the hostile nations by which he was surrounded, so that Israel could have peace.

He was so successful in this that within a few years all these nations were subdued, the boundaries of Israel were extended to their greatest limit, and the nation became supreme in that part of the world.

David next gave his attention to strengthening the laws and the religious life of the people. He brought the Ark to Jerusalem, and made that city the religious as well as the civil capital of the nation. He is supposed to have written the Twenty-fourth Psalm at the time of bringing up the Ark. He asked of God the privilege of building a temple for His worship, but because he had been a man of war, this was denied him. He was, however, permitted to make the plans and collect much of the material, which his son and successor, Solomon, wrought into the magnificent Temple of Jehovah.

The Psalms. David was said to have composed at least seventy-three of the *Psalms*, which are read and sung wherever the Bible is known, and their influence upon the Christian world is beyond estimate. He arranged the praise service for the sanctuary, and is said to have been the originator of the orchestra.

Estimate of His Character. David was the greatest king of his time, and by many authorities is considered to have been the greatest king the world has ever known. He was not a perfect man, for, like other men, he sinned, and suffered for it. But when he was convinced of wrong-doing, he was great enough to repent and obtain forgiveness. He reigned forty years and prepared for the accession of Solomon to the throne. This great ruler was one of the ancestors of Christ, "Great David's Greater Son." His farewell words to Solomon embody the chief characteristics of his own life: "Be thou therefore strong and show thyself a man."

Related Subjects. The reader is referred in these volumes to the following articles

Jews Psalms Solomon Temple

DAVID, the name of two kings of Scotland. The first, David I, lived from 1084 to 1153, and was the youngest son of Michael Canmore. When his brother Alexander became king, he was created Prince of Cumbria, and became heir to the throne. In 1113 he married Matilda, widow of the Earl of Northumbria, and eleven years later, became king. He was soon engaged in wars involving the Scottish and English crowns.

David II, son of King Robert the Bruce, was born in 1324. He married Joanna, daughter of Edward II of England, in 1328, and in the next year, though very youthful, was crowned king. He sought exile in France when England invaded Scotland, and later, in behalf of France, took up arms against England, but unsuccessfully. He was held eleven years in England, then was ransomed, and returned home.

DAVID, JACQUES LOUIS (1748-1825), a French painter, known as the father of the modern French school of painting. Among the celebrated paintings that he completed while studying in Rome were the *Death of Socrates* and the *Oath of the Horatii*. During the French Revolution, he was the artistic decorator of the national fêtes which were founded on classic customs. In 1789 he won general praise for his painting of Brutus condemning his sons to death; in 1799 he executed *The Rape of the Sabines*, receiving, it is said, 100,000 francs from its exhibition. He was directed by the emperor in 1804 to execute four commissions, and among the paintings completed in response to this order, *Napoleon's Coronation* (Louvre) remains distinguished. During the Reign of Terror, he was a zealous member of the Jacobin party, and at the trial of King Louis XVI, sitting as one of the judges, he voted for his death. For this act he was banished to Brussels, where he died in exile in 1825. See **SABINES**.

DAVID, PIERRE JEAN (1788-1856), a French sculptor popularly known as **DAVID D'ANGERS**, from his birthplace, and to distinguish him from Jacques Louis David, an artist who had befriended him. Quite early in his career he won the Prix de Rome, which enabled him to study five years (1811-1816) in the Italian capital, where he profited greatly from Canova's influence, though he retained the originality for which he was becoming known. One of his greatest works is the monument to Le Grande Conde, now in the gardens at Versailles. Another shows France in the act of bestowing crowns upon its illustrious sons, Voltaire, Mirabeau, Bonaparte, Rousseau, Carnot, and David, the painter.

DAVILA, *da' vcl lah*, the governor of Darien who ordered Balboa beheaded. See **BALBOA**.

DA VINCI, LEONARDO. See **VINCI**.

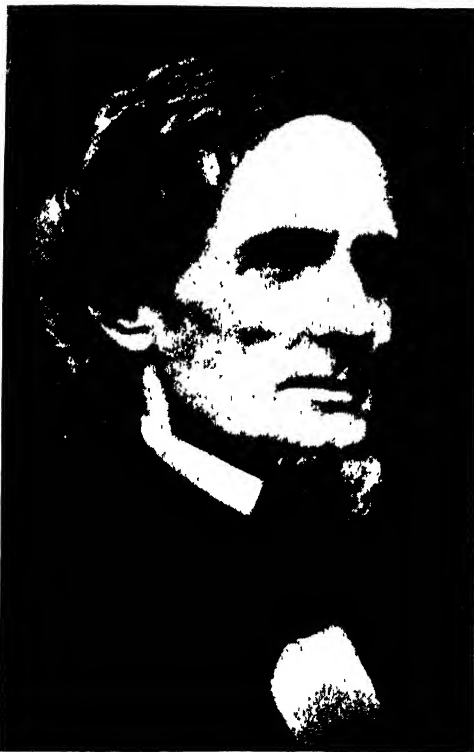
DAVIS, DWIGHT FILLEY (1879-), Secretary of War in the Cabinet of President Coolidge, and governor-general of the Philippine Islands by appointment of President Hoover, in May, 1929. To the post of Secretary of War he had advanced from the portfolio of Assistant Secretary. Davis was born in Saint Louis, Mo., and became a citizen of influence in local affairs before national attention was directed to him. He joined the A.E.F. in the World War as captain of the Fifth Missouri Infantry, and was advanced to the grades of major and lieutenant colonel; "for extraordinary heroism" he was awarded the D.S.C. in connection with operations on French battlefields at Baulny and Chaudron Farm, September 29-30, 1917. As Secretary of War he had participated in the affairs of the Philippine Islands; the good judgment shown in his administrative acts made it evident that he was well equipped to be sent as governor-general.

*The STORY of***JEFFERSON DAVIS****Home
at Montgomery, Ala.****Grave,
at Richmond****Confederate Capitol, Richmond**

DAVIS, JEFFERSON (1808-1889). This was a man who "in his person and history symbolized the solemn convictions and tragic fortunes of millions of men." The people of the South remember with admiration his gallant service on the battlefields of Mex-

ico; they are glad to recall his career in the United States Congress in the House and Senate, where he proved himself worthy to be grouped with Clay, Webster, Calhoun, and the other "giants" of an illustrious period; they are proud of his record as head of the War Department during the Presidency of Franklin Pierce, and they cherish the memories that cluster about his stainless life and character. But more than this, Jefferson Davis won a place in their hearts that possibly no other man could fill. For his people he went to prison; for them he endured hatred, slander, and ill-treatment. For all this, he won their undying affection.

He was born June 3, 1808, in that part of Christian County, Kentucky, which was later organized as Todd County. The Baptist church of the little town of Fairview now occupies the site of the house in which he was born. His father, a veteran of the American

**JEFFERSON DAVIS**

Soldier, statesman, and President of the Confederate States of America.

Revolution, was of Welsh descent; his mother came of Scotch-Irish ancestry. During the infancy of the boy, the family removed to Wilkinson County, Mississippi, the state with which his fame is associated. He completed the course of study in the county academy, then entered Transylvania College, Kentucky, and at the age of sixteen, was appointed to the United States Military Academy at West Point. Four years later, in 1828, he was graduated, though low in his class, and immediately entered active army service, with the rank of lieutenant.

Assigned to duty out on the northwestern frontier, Davis took part in the campaigns against the Indians, and was present at the capture of Black Hawk. It is worthy of note that in this war he administered the oath to Abraham Lincoln when the latter enlisted. Resigning from the army in 1835, he married the daughter of Zachary Taylor, who later became President of the United States, and settled down to the quiet life of a Mississippi cotton planter. Four

months after his marriage, he lost his wife by fever, and he himself barely escaped death from the same malady. As soon as he had



Photo U & U

BLAUVOIR, THE MISSISSIPPI HOME OF DAVIS

This old colonial home adjoins a home for Confederate soldiers, and is zealously cared for by the inmates. It was here that Mr. Davis spent his days after the War of Secession, following his liberation.

recovered, he traveled for about a year, in order to restore his health. In 1836 he returned to his plantation, where he spent several years in farming, reading, and studying political economy and political philosophy; and by careful management he acquired considerable wealth.

In 1843 Davis entered the field of politics, and in 1845 was elected to the national House of Representatives. From the beginning of his political career, he stood firmly for strict construction of the Constitution, and he gave his loyal support to John C. Calhoun.

During his term of office, hostilities with Mexico commenced, and in June, 1846, Davis resigned his seat in Congress and took command of a regiment of Mississippi volunteers, as its colonel. He served in Mexico under General Taylor, distinguishing himself for gallantry in the battles of Monterey and Buena Vista. In the latter engagement, he fought all of one day with a bullet in his foot, and returned home on crutches after the war.

In 1847 the governor of Mississippi appointed Davis successor to a United States Senator who had died; the following year he was elected by the Mississippi legislature for

the remainder of the term, and in 1850 for a full term. In that year, the famous compromise measures fathered by Henry Clay came before the Senate. Davis took an active part in the debates, arguing against the measures and coming frequently into opposition with Senator Douglas of Illinois, whose theory of squatter sovereignty he held to be unsound. In 1851 he resigned from the Senate to become the candidate of the States'-Rights Democrats for the governorship of Mississippi, and was defeated by a small majority, after a stirring campaign that attracted the attention of the nation.

In 1853, at the beginning of the administration of Franklin Pierce, Davis was appointed Secretary of War, and for four years performed the duties of that office with distinction. He introduced an improved system of infantry tactics, brought about the substitution of iron for wood in gun carriages, effected an increase in the army, organized engineer companies to explore the proposed routes for a railway connecting the Mississippi Valley with the Pacific Ocean, and strengthened the coast and frontier defenses. At the close of his term of office, he was reelected to the Senate,

where he became the recognized spokesman of the South and the champion of the doctrine that a state has the right to choose and maintain its own institutions, without interference from the general government. Calhoun, the great defender of the states'-rights theory, had passed away, but the Southern cause found an able and eloquent champion in the Senator from Mississippi.

With the election of Abraham Lincoln to the Presidency of the United States, the anti-slavery struggle reached a crisis, and when Mississippi passed the ordinance of secession, Davis resigned from the Senate. His last speech, delivered on January 21, 1861, was a noble expression of his belief in the righteousness of the Southern cause, and yet it was with sincere regret that he bade his associates farewell.

Shortly after his return to Mississippi, he received news of his election as provisional President of the Confederate States. He was inaugurated on February 18, 1861, and a year later was elected permanent President. His career as Chief Executive showed his ability and his high sense of honor and of duty; the labors and trials he endured are faithfully portrayed in his *Rise and Fall of the Confederate Government*, published in 1881. Throughout the war, he acted with dignity, sincerity, and devotion to principle, and he endeavored with all the force of his nature to lessen the suffering that was an inevitable feature of the bitter struggle.

Soon after the surrender of General Lee, Davis was taken prisoner and was confined in Fortress Monroe. A Virginia grand jury indicted him for treason, and for two years he remained in prison, unable to secure a trial. In 1867 he was released on bail, Horace Greeley and other prominent Northern men qualifying as bondsmen. He was included in the general amnesty of 1868, and in February, 1869, was given full liberty.

His last years were spent in dignified retirement, in which he gave himself up to writing and study. He died on December 6, 1889, and was buried in New Orleans, but in 1893 his body was removed to Richmond, where a monument has been erected to his memory. In the same city is a monument to his daughter Winnie. In 1844 he had married a daughter of William B. Howell, son of Governor Howell of New Jersey. This gifted woman wrote an excellent biography of the great Southern leader.

Related Subjects. The following articles in these volumes will make more clear certain phases in the career of Jefferson Davis and of the times in which he lived

Black Hawk
Calhoun, John C.
Compromise of 1850
Confederate States
Fort Monroe
Mexican War

Monterey, Battle of
Nullification
Secession
Squatter Sovereignty
States' Rights
War of Secession

DAVIS, JOHN WILLIAM (1873-), an American statesman and diplomat, nominated for President of the United States on the 1932



Photo U & U

JOHN W. DAVIS

ballot at the Democratic national convention in June, 1924, and defeated in the general election in November by Calvin Coolidge. Davis was born in Clarksburg, W. Va., the only boy in a family of six children. Since there were no adequate boys' schools in what was then a small mountain town, John's mother superintended his early education, and at a later period, he and several other boys attended a girls' school for a short time. From his father—deep student, influential attorney, and "Jeffersonian" Democrat—John acquired the habit of reading, and at an early age became familiar with the writings of Sir Walter Scott, James Fenimore Cooper, and Washington Irving. To-day, he quotes readily from Herodotus, Aristotle, Cavour, and others. His formal education was concluded at Washington and Lee University; he was graduated from the law school of that institution in 1895, and taught one year in his *alma mater* before beginning private law practice in Clarksburg.

Davis' public career was marked by a steady progression from relatively unimportant posts to places of high responsibility. He was elected a member of the West Virginia legislature (1895), was chairman of the Democratic county committee (1900), delegate to the Democratic national convention (1904), president of the West Virginia Bar Association (1906), and member of Congress for two terms (1910 to 1914); he became Solicitor-General of the United States (1913) by appointment of President Wilson, and a member of the American High Commission to treat with Germany regarding exchange of war prisoners (1918). Davis achieved international prestige in his appointment as ambassador to Great Britain, a post he accepted in 1918. He relinquished this high honor in 1921, because unable longer to meet the financial requirements of the position, and then became senior member in a New York law firm, severing that connection after his nomination for the Presidency. In 1922 he was made president of the American Bar Association.

DAVIS, REBECCA HARDING and **RICHARD HARDING**, mother and son, two writers who won distinction in the field of American fiction.

Rebecca Harding Davis (1831-1920) was the wife of L. Clarke Davis, editor of the *Philadelphia Inquirer*. Her first story, *Life in the Iron Mills*, published in the *Atlantic Monthly* in 1861, attracted wide attention because of its realism, and it marked the introduction of a new theme in American fiction—the labor question. She contributed to several current publications, notably *The Youth's Companion*, winning fame through her interesting stories for young people. Among her books are *A Law Unto Herself*, *Kitty's Choice*, *Dallas Galbraith*, *Kent Hampden*, and *Bits of Gossip*.

Richard Harding Davis (1864-1916) held high rank among modern short-story writers and as a war correspondent. He was born in Philadelphia, Pa., and was educated at Johns Hopkins and Lehigh universities. The real foundation for his literary work, however, came in his experience as a reporter in Philadelphia and as a war correspondent for the *London Times* and the *New York Herald* in the Turkish-Greek, Spanish-American, Boer, and Russo-Japanese wars, and in the early months of the World War. While on the latter assignment, he proved himself one of the greatest of war correspondents. He was a trained and alert observer, and drew his word pictures with bold and telling strokes, revealing a keen sense of the dramatic.

His Writings. Among the best-known of his stories are *Ransom's Folly*, a tale of the adventures of a young officer at a United States army post, and *The Bar Sinister*, a remarkable story of a dog. Other notable titles are *Van Bibber and Others*, *Soldiers of Fortune*, *Captain Macklin*, *The Man Who Could Not Lose*, and *The Lost Road*. His books of travel and stories of his war experiences, which have all the admirable qualities of his fiction, include *Cuba in War Times*, *With Both Armies in South Africa*, and *The Congo and the Coast of Africa*. He wrote several plays, among which are *The Taming of Helen*, *The Dictator*, and *Blackmail*.

DAVIS AND ELKINS COLLEGE. See WEST VIRGINIA (Education).

DAVIS STRAIT. See map, NORTH AMERICA.

DAVITT, dav' it, MICHAEL (1846-1906), an Irish political leader, founder of the Irish Land League, organized to free the land from landlordism. His parents had been evicted from their home for non-payment of rent when he was a child. This event embittered his whole life, and aroused in him a hatred of everything English. While working in a cotton mill in Lancashire, he lost his right arm. He found work, however, in a printing office and educated himself in his spare time. He visited America several times to obtain assistance in the organization of the Land League, and in 1870 was sentenced to fifteen years' im-

prisonment for bringing arms into Ireland. Liberated in 1877, he still continued his bitter campaign against landlordism, and was again imprisoned. He was elected to Parliament on several occasions, but was refused admission. Later, he was returned unopposed, but bankruptcy necessitated his resignation. He was a prolific writer, but his bitterness shows clearly in all his works.

DAVY, da' vie, SIR HUMPHRY (1778-1829), an English chemist whose invention of a safety lamp for use in mines is one of the greatest gifts of science to mankind. At the age of twenty-two, he was appointed lecturer to the Royal Institution of London, and a year later was made its professor of chemistry. His researches and experiments gained for him a great reputation. At a time when England and France were at war, he was invited to visit the latter country, and there he was received with the greatest respect. He was knighted, and later married a lady of great wealth, and

was thus enabled to devote all his energies to scientific research. He decomposed potash, soda, and strontia, and set free the metals which form the base of this large group of compounds. This achievement placed him above all other chemists of his time. After thoroughly investigating fire damp, he produced the Davy lamp, which made mines comparatively safe from explosions. See ELECTRIC LIGHT; SAFETY LAMP.

DAVY JONES, a term for the spirit of the sea.

DAWES, dawz, CHARLES GATES (1865-). This distinguished American citizen has served his country in many different fields. In the World War, he rose to the rank of brigadier general, and at its close he became director of the Federal budget. Later, having won admiration for his skillful handling of the German financial problem (see DAWES PLAN), he was elected Vice-President of the United States, and served with Calvin Coolidge from 1925 to 1929. Dawes was born in Marietta, O., August 27, 1865, took collegiate and post-graduate degrees in Marietta College in 1884 and 1887, and a degree in law at the Cincinnati Law School in 1886. Ready for his life work, as he then viewed his future, he moved to Lincoln, Nebraska, where he became a townsman and neighbor of William J. Bryan and John J. Pershing.



Photo Brown Bros

RICHARD HARDING DAVIS



Photo Brown Bros

SIR HUMPHRY DAVY

His great organizing ability drew him from the law to the field of finance, with one early essay into politics. He moved to Chicago in 1894, and made his home in Evanston, a northern



CHARLES GATES DAWES

Photo Matsuno

suburb. Public utilities attracted him, and he soon controlled gas companies operating in several cities. When McKinley was nominated for the office of President of the United States, Dawes did effective work for him in Illinois, and the new President chose him for the post of Comptroller of the Currency (1897). He was then but thirty-two years old. He later desired to become a United States Senator; this was the only office he ever sought, but the Illinois legislature would not give it to him. In 1902 he organized and became president of what grew to be a great banking house in Chicago, known as the Central Trust Company of Illinois.

His Work in the War. At the outbreak of the war, Dawes enlisted for foreign service. He was rejected for the artillery division because of his age, but was commissioned lieutenant colonel of engineers. In France, when Pershing needed a chairman of the general purchasing board of the army, he chose Dawes, who was raised to the rank of brigadier general; later he became a member of the purchasing board for all the allied forces. After the war, Belgium conferred on him the decoration of the Order of Leopold; France made him a Commander

of the Legion of Honor, and the Congress of the United States gave him the Distinguished Service Medal.

After the War. In 1921 President Harding drafted him to put the United States under the budget system. Preceding Presidents had endorsed the system, but political pressure had nullified their efforts. Harding gave Dawes the support he needed, and the task was accomplished. The future Vice-President had steadily risen in public favor, which was not lessened when as an outspoken witness before a Senate committee he vindicated the acts of the army commanders in France with respect to purchases.

In 1924 Dawes was chosen unanimously (with the exception of the Wisconsin delegation) as the nominee for Vice-President. He made a forceful campaign in behalf of the Republican ticket; Coolidge and Dawes were elected by the greatest majority ever recorded up to that time in a Presidential contest. As Vice-President, he endeavored to persuade the Senate to adopt rules to prevent dilatory practices in order that public business might be expedited, but that body clung to precedent in spite of the general popularity of the Dawes proposal.

After the expiration of his term, in 1929, Dawes resumed his duties as chairman of the board of directors of the Central Trust Company, in Chicago. He also accepted the position of chairman of an advisory commission to recommend improvements in the financial and economic administration of Santo Domingo, on the invitation of President Horacio Vasquez. This task completed, he was appointed ambassador to Great Britain, in April, 1929.

DAWES PLAN. During the year 1923, the fortunes of the German republic reached their lowest ebb, and it was apparent to all observers that the country would collapse, financially and economically, if the problem of German reparations were not settled. In November, 1923, the permanent Reparations Commission appointed a committee of experts to survey Germany's currency situation, credit facilities, resources, etc., and to recommend amounts, dates, and methods of paying the allied claims. Because this committee was headed by Charles G. Dawes of Chicago (later Vice-President of the United States), the settlement proposed has come to be known as the Dawes Plan. The salient points of this plan are summarized below:

(1) Payments were to be made on a sliding scale, beginning with 110,000,000 gold marks for the first year (1926-1927), and increasing after four years to 2,500,000,000 gold marks annually.

(2) The payments were to be secured through taxation, railways and industrial debentures, and a mortgage for this purpose was to be placed on the industries of the country.

(3) An index of prosperity was to be used to ascertain Germany's ability to keep up payments. This would be based upon imports and exports, receipts and expenditures, railroad traffic, the value of the consumption of sugar, tobacco, beer, and alcohol by the total population, and the amount of coal consumed.

(4) A foreign loan of 800,000,000 gold marks was to be secured, to serve as a fund for immediate requirements.

(5) A bank of issue was to be created to further the stabilizing of German currency.

(6) An international organization of control was to be established.

While the Dawes Plan met with opposition from the monarchists, it was accepted by the Reichstag in August, 1924, and was officially in operation by September 1. As a result of the plan, German currency became stabilized, and business and industry slowly worked their way back to normal conditions.

In 1929, after much discussion of German debts to the allied nations, another commission sought ways and means for modification of the Dawes Plan, to the end that the German nation might be given less onerous yearly terms of payment. On this commission, J. Pierpont Morgan and Owen D. Young served as the American members. The new plan of reparations payments appears in the article **WAR DEBTS**. See, also, **RUHR**; **GERMANY**.

DAWN. See **TWILIGHT**.

DAWSON, OR **DAWSON CITY**. See **YUKON**; **KLONDIKE**; **DAWSON**, **GEORGE MERCER**.

DAWSON, the family name of a father and son who were authorities in the field of Canadian geology.

Sir John William Dawson (1820-1890), was born of Scotch parents at Pictou, in Nova Scotia, and went to Scotland to study at the University of Edinburgh, from which he was graduated in 1842. The same year, he accompanied Sir Charles Lyell (which see) on several geological expeditions, and made a special study of the fossil forests of Nova Scotia. From 1850 to 1853, he was superintendent of education for that province, and in 1855 became professor of geology and principal of McGill University, which attained high rank under his administration. Though he did not resign this position until 1893, he found time to write a score of books and scientific monographs. Dawson was the first president of the Royal Society of Canada.

His Books. Among his published works are *Acadian Geology*; *Air-Breathers of the Coal Period*; *The Dawn of Life*; *The Canadian Ice Age*, and *The Story of the Earth and Man*.

George Mercer Dawson (1840-1901), son of Sir John, was born at Pictou and educated at McGill University and the Royal School of Mines, London. In 1873, he was appointed geologist and naturalist to the North American Boundary Commission, and in 1875 became a member of the staff of the Geological Survey of the Dominion, later becoming its director. He was in charge of the Canadian government's Yukon survey in 1887, and for that reason Dawson

City is named for him. In 1894 he took an important part in the arbitration of the controversy regarding the seal fisheries in the Bering Sea. He was the author of many scientific papers and reports, especially on the surface geology and mineral formations of Northern and Western Canada. **G.H.L.**

DAWSON, **CONINGSBY [WILLIAM]** (1883-), a British-American author, born in England and educated at Oxford University. During the World War, he fought in the Canadian army in France, and in 1919 visited Europe to study reconstruction problems and to report to Herbert Hoover (later Secretary of Commerce and President of the United States) on the condition of the devastated regions. Dawson spent several years before the war as literary adviser to a publishing firm in New York.

His Literary Work. Principal among Dawson's books are *The House of Weeping Women*, *Florence on a Certain Night*, *Slaves of Freedom*, *The Road to Avalon*, *The Glory of the Trenches*, *Living Bayonets* (the last two, stories of the war), *It Might Have Happened to You*, *The Kingdom Round the Corner*, *The Vanishing Point*, and *Coast of Folly*. He collaborated with his father in editing *The Reader's Library*.

DAY, the period of time required for the earth to make one revolution on its axis, or twenty-four hours. In law, a day is generally considered to extend from midnight to midnight, but a *business* day includes only the business hours customary in any given locality. Also, *day* may mean the period during which the sun is shining upon a given portion of the earth, or the period of daylight. The light is called *day* and the darkness *night*. In the temperate and the polar regions, the days and nights vary in length; at the equator they are of equal length. See **SEASONS**.

For business and all other ordinary purposes in most parts of the world, the day of twenty-four hours is divided into two periods, the forenoon (A.M.) extending from midnight to noon, and the afternoon (P.M.) extending from noon to midnight. The railroads in Western Canada arrange their schedules on a twenty-four hour day, numbering the hours from one o'clock A.M. to twenty-four o'clock. The twenty-four hour day is also used in France.

Astronomers use a day measured by the time required for the earth to make a complete revolution on its axis in reference to a fixed star. Since the star is so far away that the movement of the earth in its orbit is practically unnoticeable in reference to it, this day is a little shorter than our civil day of twenty-four hours. It is exactly 23 hours, 56 minutes, 4.098 seconds, and is known as the *sidereal* day. Instead of writing 1 P.M., the astronomers would write the *thirteenth hour*.

The Babylonians began the day at sunrise, the Jews at sunset, and the Egyptians and Romans at midnight.

Longest and Shortest Days. In the northern hemisphere, the longest day is June 21, and the shortest day, December 21. The variation in length of these two days according to latitude is shown in the accompanying table. From 70° northward to the poles, the days are longer than twenty-four hours. They grow steadily in length until, at the poles, the sun remains above the horizon continuously for six months.

LATITUDE	JUNE 21		DECEMBER 21	
	HRS.	MIN.	HRS.	MIN.
10°	12	35	11	25
20°	13	13	10	47
30°	13	50	10	4
40°	14	51	9	9
50°	16	9	7	51
60°	18	30	5	30

DAY FLY. See MAY FLY.

DAYLIGHT AND DARKNESS. See ARCTIC CIRCLE.

DAYLIGHT SAVING, a plan originally devised for conserving fuel, practiced in Europe during the World War and adopted throughout the United States for one year (1918). Under the law, clocks were turned ahead an hour on the last Sunday in March and turned back again on the last Sunday in October. All people pursued their usual activities by clock time, ignoring the actual change, and no embarrassment resulted. While conservation was the result sought, the daylight saving was welcomed by city workers, whose hours for recreation were thereby increased, but was strongly opposed by farmers, who declared that their schedule of labor was thereby disarranged. Officially, the time from March to October was known as summer time; from October to March, winter time. Pressure upon Congress in 1919 caused repeal. Many cities, however, have adopted daylight saving independently. In Europe, summer time, as it is there called, is very generally observed.

DAY LILY, the popular name of a genus of hardy, sun-loving, lilylike plants whose beautiful yellow or orange blossoms live but from the rise of sun to its setting. The genus is known to botanists as *Heimerocallis*, a word from the Greek meaning *beautiful for a day*.

Long leaves, in some species grasslike, spring from fleshy, fibrous roots. The flowers appear in loose clusters at the top of a leafless stalk three to five feet high. There are six or twelve in a cluster, two or three opening each day. They are funnel-shaped, like a lily, and six-parted, with six stamens and long-stalked anthers, heavily laden with pollen. Day lilies are hardy, easy to cultivate, and in good rich soil in a moist, shady spot, make excellent border plants, giving a wealth of blossoms from June to September. The name day lily is also applied to the related genus *Funkia*, which

is distinguished in part by its white and blue flowers.

B.M.D.

Scientific Names. Day lilies belong to the family *Liliaceae*. Favorite species include the fragrant yel-



THE DAY LILY

low day lily, or lemon lily, *Heimerocallis flava*, and the orange-colored *H. fulva*, or tawny day lily.

DAYS OF GRACE. See NOTE; GRACE, DAYS OF.

DAYTON, ALSTON G. See IMPEACHMENT.

DAYTON, O., a manufacturing city and the county seat of Montgomery County, is situated in the southwestern part of the state, on both banks of Great Miami River, at the point where it receives the waters of Mad and Stillwater rivers. Cincinnati is sixty miles southwest, Columbus is seventy-two miles northeast, and Toledo, 147 miles slightly north-east. Population, 1928, 184,500 (Federal estimate).

Dayton was the home of the Wright brothers, inventors of the airplane, and there are six aviation fields and an airplane-manufacturing plant here. Wright Field, the largest in the world, covers 5,000 acres, and is used by the Experimental and Research Division of the Army Air Service, which is located in Dayton. The National Military Home, built after the War of Secession and now housing veterans of all wars, is also located in Dayton. A handsome soldiers' monument is one of the attractions of the city.



AIRPLANE VIEW OF DAYTON

Photo Wide World

Transportation. The city is served by the Baltimore & Ohio; the Cleveland, Cincinnati, Chicago & Saint Louis; the Pennsylvania; the Dayton & Union; and the Erie railways, it has numerous interurban and motorbus lines.

Industries. Dayton has over 500 manufacturing plants. The city is the home of the National cash register, a well-known electric refrigeration unit, and other nationally known products. Food products, textiles, iron and steel products, beverages, chemicals, stoves, clay and glass products, and vehicles are also important.

Institutions. The city has Notre Dame Academy, the University of Dayton, Bonebrooke Theological Seminary, Central Theological Seminary, a normal college, and an art institute. Antioch College is located a few miles east. The public library, in Cooper's Park, is supplemented by numerous branches. Dayton also has the state hospital for the insane.

History. In November, 1796, the present city of Dayton was laid out by General Israel Ludlow and a party of Revolutionary soldiers. It was incorporated in 1805 and named for General Jonathan Dayton, one of the first settlers. The city charter was granted in 1841. An epidemic of cholera visited Dayton in 1840, and it has been damaged by floods several times; the most serious disaster from this source occurred in March, 1913, when the city

sustained considerable property loss. It now has one of the greatest flood-protection projects in the world, consisting of five immense dry reservoirs, completed in 1922. Dayton adopted the commission-manager form of government in 1913.

DEACONESS, *de' k'n ess*, a member of a religious order connected with several of the Protestant churches. The order is composed of women who devote their lives to serving the people, under the direction of the Church, in special fields in which pastors cannot work. They have definite centers of work called *deaconess homes*, where they live as communities and where those who need their services are always able to find them. Their chief duties consist in nursing the sick who cannot pay for such assistance and in ministering to the spiritual and material necessities of the distressed and needy. The members usually wear a distinguishing costume, though it is inconspicuous, but they do not take any vows as to time of service. They are required to take a two-years' course of study in special training schools to prepare them for their work, and are inducted into the order by the authorities of the Church to which they belong.

The deaconess movement was inaugurated in modern times in the first half of the last century, by Pastor Fliehdner of the United Evangelical Church of Prussia. The first deaconess home in America was established by the Lutheran Church in New York in 1852. The next was founded by Saint Andrew's Episcopal Church in Baltimore in 1855. In 1888 the General Conference of the Methodist Episcopal Church authorized the establishment of the order, and the first Methodist deaconess home was founded in Chicago. The order was given a warm welcome by this Church, which now leads all other denominations in deaconess work.

DEAD-LETTER OFFICE, a division of the Postoffice Department of a country, to which mail matter which is unclaimed or cannot be delivered is sent from the local postoffices throughout the country. This matter includes letters and packages which have remained for one month uncalled for; all that are imperfectly addressed or are without stamps, unless sender is known; also all articles barred from the mails—liquids, live animals, and explosives. Excluded from the above are all pieces of undelivered mail matter which bear the names of the senders and can thus be returned to them.

The amount of mail matter which the Dead-Letter Office of the United States receives runs into millions of pieces annually. Statistics for a recent year show that over 26,000,000 undeliverable letters and nearly 500,000 packages were sent to the Dead-Letter Office. Over 4,200,000 letters and 122,000 packages were opened and returned to senders. About \$115,000 in money and \$30,000 in postage stamps were found in the letters and packages, more than \$5,200,000 in drafts, checks, and money orders were also found. Of these total amounts, all but about \$41,000 cash and \$22,000 in stamps were returned to the writers. All unidentified sums were added to the revenues of the Postoffice Department. Thousands of misdirected magazines and newspapers are sent yearly to Washington hospitals.

This department of the postoffice is under the control of the First Assistant Postmaster-General. Until January 1, 1917, the Dead-Letter division was controlled entirely from Washington, but on that date three branches were established—at New York, Chicago, and San Francisco—to handle all dead-letter material within specified zones.

DEADLY NIGHTSHADE. See **BELLADONNA**.

DEAD SEA. Strange stories and legends have been told of this salt lake, or sea, in Palestine, so unlike any other body of water. Travelers of the Middle Ages reported that no bird could fly over it, and no plant could live in the poisonous air which surrounds it. Mod-

ern scientific observation explains the absence of birds by the absence of fish, and the dearth of vegetation by the slight rainfall and the lack of fresh water. The sea lies at the bottom of the deepest "fault" or fracture of the earth's surface, 1,290 feet below sea level. Its greatest



LOCATION MAP

depth is 1,310 feet. The River Jordan, the most noted stream in history, flows into it from the north, through a rapidly descending valley. On the east, the white limestone walls of the Plain of Moab rise abruptly 4,400 feet above it, while the plateau of Judea towers half that height on the west. Spring-fed lagoons exist in a few places around its shores.

The lake itself is about forty-seven miles long and ten miles wide, with an area of 360 square miles. The water contains about twenty-five per cent of solid matter, chiefly common salt, which is practically double the percentage of salt in Great Salt Lake, Utah. It is nearly six times as salty as the ocean, and so dense that a human body will float on the surface. Although the Jordan pours several million gallons of fresh water into the Dead Sea every day and the sea itself has no outlet, the water never rises any higher, and never grows less salty. This condition is due to evaporation, because the heat in this deep cleft of the earth is very intense. There is not a vestige of animal life in the sea or in its vicinity, and no vegetation can grow there. Sulphur, rock salt, and lava strew its shores. Poisonous gases escape from its surface, and the water is ill-smelling. Notwithstanding all this, the



Photo Vanderburgh

ON THE SHORE OF THE DEAD SEA

The ruined hull of an old vessel is typical of the desolation around this ancient waste of water and sand. The scene above was photographed not far from the old site of Jericho.

calm, sparkling waters of this sea lie deep between rocks and cliffs of unsurpassable grandeur, and the play of brilliant colors on the unhewn mountain sides adds to the scene.

From a practical standpoint, the sea is a valuable store-house of mineral wealth. Besides immense quantities of common salt (sodium chloride), it contains magnesium chloride, potassium chloride, and magnesium bromide. After the League of Nations granted the British government the mandate for Palestine, preparations went forward for utilizing the Dead Sea minerals, which are the source of potash, bromine, table salt, gypsum, and other chemical products. The value of all of the salts in solution has not been estimated, but it is believed that the total will reach twelve hundred billion dollars, because of the ease and cheapness with which the salts may be extracted. Part of the profit from the exploitation of the minerals is being used for the upbuilding of Palestine.

The Dead Sea has a long history, dating back to the patriarchal narratives of *Genesis*, where it is told that the wicked cities of Sodom and Gomorrah were destroyed, after the escape of the righteous Lot and his family, by a rain of fire and brimstone (perhaps a volcanic eruption), and that they were covered up by the "Salt Sea." To this day, the Arabs call the lake *Bahr Lut*—Sea of Lot. See JORDAN RIVER; PALESTINE.

DEAF AND DUMB, OR DEAF-MUTES, are those persons who can neither hear nor speak. Those who are born deaf, or become so in

infancy, suffer from the additional affliction of dumbness because they cannot hear others speak, and therefore do not learn to articulate words. Mutes of this class are to be distinguished from those whose lack of speech results from defects of the speech centers in the brain, or from imperfect organs of articulation. When deafness comes upon those who have already learned to talk, they retain the power of speech, though the voice often becomes harsh and unnatural. Mutes who are taught to articulate words do not acquire a perfectly natural speaking voice, the rising and falling inflections which give variety to the speech being more or less absent.

Causes of Deafness. The deaf are grouped into two classes—those who are born deaf and those who lose their hearing after birth. The former are afflicted with what is called *congenital* deafness, or deafness from birth; the latter with *accidental*, or *acquired*, deafness. In the first case, the harm is done before the birth of the child, who suffers from what is known as arrested development. In some instances, physicians agree, this condition exists as a family trait, due to alcoholism, insanity, or certain forms of disease, notably syphilis, and the deafness is transmitted by heredity. The intermarriage of near relatives who inherit similar tendencies to disease is a very common cause of deafness at birth. It is estimated that about twenty-five per cent of the deaf-mutes of France and ten per cent of those in the United States, Canada, and England are the children of near-related parents.

Acquired deafness, which occurs at all ages, may be permanent or temporary, partial or complete. Sometimes only one ear is affected, in which case the person is not seriously handicapped. Acquired deafness is often a process of slow development, the hearing failing gradually and perhaps never ceasing wholly, though the sufferer may hear with difficulty.

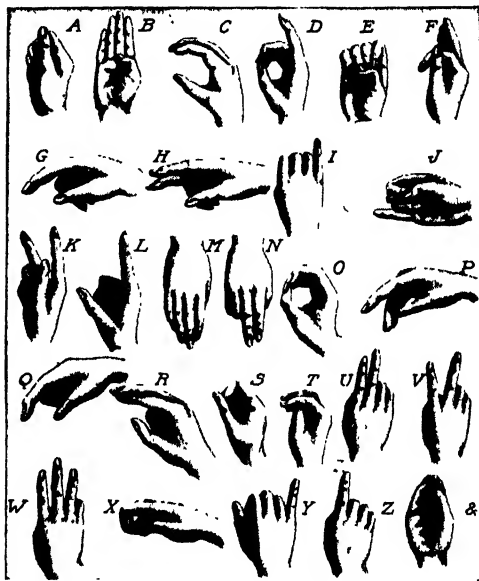
These varying conditions are due chiefly to (a) deposits of wax in the ear, which touch the membrane of the drum; (b) inflammation of the lining membrane of the canals (Eustachian tubes) that lead from the upper part of the throat to the middle ear [see EAR (Middle Ear)]; (c) piercing of the drum membrane; (d) disease of the middle ear, causing the joints of the small bones of the ear (ossicles) to stiffen, and interfering with their movements; (e) disease of the auditory nerve or of the brain, whereby some of the auditory centers are affected; (f) other diseases, such as spinal meningitis, scarlet fever, measles, or mumps, which affect the middle ear. Sometimes a violent blow upon the ear causes deafness by rupturing the drum, and a constant noise, as that in a machine shop or the incessant roar of battle, may produce loss of hearing by overstimulating the auditory nerve.

The Education of Deaf-Mutes. Historical. Shut in within himself and unable to communicate freely with his fellows, the deaf-mute of early historical times was a pitiable object, considered by the law to have no more intelligence than a madman. The Greeks and Romans put their deaf-mutes out of the way, regarding them as useless encumbrances, and in France the parents of these unfortunates regarded them as a family disgrace and shut them up in convents and asylums. It would seem that Christ was the first to have compassion on these defectives, for among His works of mercy were the opening of the ears of the deaf and the loosening of the tongues of the dumb.

Probably the first person who attempted to educate the deaf was an English bishop of the seventh century, who, according to a story told by the Venerable Bede, performed a miracle by teaching a deaf-mute to talk. Then, after a lapse of many centuries, an Italian philosopher, Jerome Cardan (1501-1576), aroused the interest of the public in the subject by declaring, authoritatively, that "written characters and ideas may be connected together without the use of sounds." Cardan also pointed out that deaf-mutes were normal beings in intelligence. Shortly after this, a Spanish Benedictine monk gave regular instruction to the deaf and dumb, whom he taught, as he said, "to speak, read, write, reckon, pray, serve at the altar, know Christian doctrine, and confess with a loud voice." Another Benedictine monk, Juan Bonet, pub-

lished in 1620 what is probably the first treatise on the education of deaf-mutes. These pioneer teachers used signs, pantomime, and finger-spelling.

In 1648 the first English treatise on the subject was published by Dr. John Bulwer, and the movement in Europe was fairly started with the establishment of a school for poor deaf-mutes in Paris, in 1760. The founder of this school, Charles-Michel de l'Epée, was one



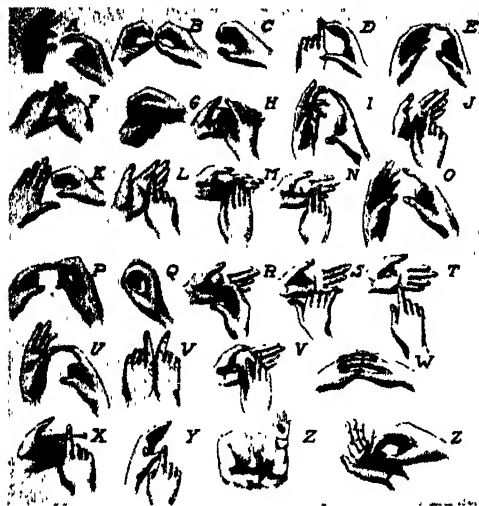
DEAF AND DUMB ALPHABET

For one hand.

of the greatest benefactors the deaf have ever had. Eighteen years later, the first public institution was opened in Leipzig. It was not until early in the nineteenth century, however, that the education of the deaf and dumb was placed on a systematic, organized basis. At the present time, institutions for the deaf are maintained in practically every country in Europe, in Japan, China, India, Burma, Hawaii, and the Philippines.

In America, Connecticut led the way, the first permanent school for the instruction of the deaf being opened at Hartford in 1817. A few years previous to this, an unsuccessful attempt had been made to found such a school in Virginia. New York and Massachusetts were the next states to begin the systematic education of deaf-mutes, and now every state in the Union, except New Hampshire and Wyoming, has one or more institutions in which they receive instruction. Public day schools for the deaf are maintained in California, Colorado, Georgia, Illinois, Indiana, Iowa, Kansas, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Jersey,

New York, Ohio, Oregon, Oklahoma, Texas, Virginia, Washington, and Wisconsin. In the number of deaf-mute institutions, the United States leads the countries of the world, with nearly two hundred state institutions, public day schools and private schools. Some authorities believe that the deaf and the hearing should



DEAF AND DUMB ALPHABET
For two hands

be taught together in the same school; interesting experiments along this line have been made in Chicago, Milwaukee, and New York.

Schools for the deaf are maintained in several cities of Canada, particularly Halifax, Montreal, Quebec, Toronto, and Winnipeg.

Attention is also being given to the development and training of the residual hearing that exists in the cases of very many so-called deaf-mutes. This is, perhaps, their most valuable possession, as it supplies the only normal means of access to the speech centers of the brain. It has been found by patient effort that an amount of hearing so slight as to be overlooked by the average physician and parent can be so educated as to develop in the child's brain a considerable ability to interpret speech by ear and to modify the speaking tones.

A very important development in the matter of teaching lip-reading to deafened adults has recently taken place in the United States, and is now being taken up by some European countries. There are over forty schools of lip-reading for adults, conducted by hard-of-hearing men and women, mostly women, in various cities and towns of the United States. Many "Leagues for the Hard-of-Hearing" have been organized, and these are united in an "American Federation of Organizations for the Hard-of-Hearing." This federation is doing a very valuable and important work by

surveying the public schools and discovering that more than a million pupils have defects of hearing too slight to make them suitable candidates for the special schools for the deaf, yet sufficient to make medical and educational attention desirable. This special attention is rapidly being provided, and as a result, thousands of public-school children who had previously been considered dull and backward are being restored to grade and are succeeding in their studies.

Methods of Instruction. The education of the deaf and dumb is carried on by means of two general methods, the *sign* and the *articulation* methods. When the former is used, ideas are communicated through the medium of gesture, facial expression, and pantomime, and by means of the manual alphabet, whereby the pupil is taught to spell with his hands. The two forms of the manual alphabet, the one-handed and the two-handed, are shown in the accompanying illustrations.

The articulation method is used both in teaching the deaf-mute to understand what is said to him and in teaching him to speak. By watching the motions of the lips of his teacher, he learns to interpret what is said, though he cannot hear the words. This method of interpretation is known as lip-reading. One who has acquired a mastery of it can understand a public lecturer, if he is not too far from the speaker, and also the utterances of the actors in a moving-picture play. Those who have always heard can scarcely appreciate what the mastery of lip-reading means to a deaf person in just the ordinary routine of life. Experience has demonstrated the truth of what theory indicates, that the best results in speech and lip-reading cannot be attained by the deaf when any use is made of the sign language or finger spelling during the educational period. For this reason, the use of silent methods of communication is steadily decreasing in the schools for the deaf, and in one hundred twenty of the schools in the United States no use is made of the sign language or finger spelling.

Mutes are taught to speak by observing the lips and other vocal organs of the teacher, and then imitating the motions. When certain sounds are pronounced, the pupil touches the teacher's throat, thus being better able to imitate the vibration and position of the muscles. The Wright Oral School of New York City is one of the best oral schools for the deaf.

The Bell system, invented by A. Melville Bell of Edinburgh and introduced into America in 1872 by his son, Alexander Graham Bell, consists of a series of alphabetical characters based on the position of the vocal organs when they are in motion. These characters suggest to the eye the mechanical process of speech in the formation of all the sounds that can be uttered.

For many years after schools for the deaf were established, pupils were not admitted until they were eight or ten years of age. Gradually it was realized that school instruction should begin at about five years of age, but that the years between birth and school age were practically wasted, from the standpoint of language acquisition. Recently, a body of literature has become available for the instruction and guidance of parents of deaf children in their training at home, before they are of school age. Among works of this character are John D. Wright's *What the Mother of a Deaf Child Ought to Know*, and his *The Little Deaf Child*, and late volumes of the *Volta Review*, published in Washington, D. C., by the Volta Bureau.

What can be accomplished in the education of the deaf and dumb is strikingly shown in the achievement of Miss Helen Keller. Though deaf and dumb from infancy, and blind after the age of nineteen months, she is a college graduate and successful writer, and she became a lecturer of note.

J.D.W.

Related Subjects. The reader is referred to the following articles in these volumes

Bell, Alexander Graham	Keller, Helen Adams
Bridgman, Laura Dewey	Sign Language

DEARBORN, HENRY. See FORT DEARBORN.

DEATH. In all plant and animal life, there is a time when the vital functions cease to exist. This is called *death*. The physiologist says that the final cause of death in man is the stopping of the heart's action, which results in the arrest of the circulation and the death of the bodily tissues through lack of nourishment. The average person thinks of death as the final episode in the drama of life; comparatively, he pictures life as a long line, and death a mere dot at the end of it.

When Death Begins. As a matter of fact, death begins with birth, for throughout the span of life every part of the organism has its period of vitality and decay, and in continuous succession old cells are destroyed and new ones are formed in all the body tissues. Speaking figuratively, life and death are engaged in a struggle that ends only when death is finally victorious. Sometimes death is aided by disease, accident, or violence, but even when man lives to old age, life must finally succumb to the forces of decay. This is the period, wrote the author of *Ecclesiastes*, "when the keepers of the house shall tremble, and the strong men shall bow themselves, and the grinders cease because they are few, and those that look out of the windows be darkened."

Its Meaning. Man, fascinated by the spiritual meaning of death, from the very beginning of time has formulated theories concerning the great "undiscovered country, from whose bourn no traveler returns." To the believer in the

immortality of the soul, death is what Longfellow expresses so beautifully in his *Resignation*:

There is no Death! what seems so is transition;
This life of mortal breath
Is but a suburb of the life elysian
Whose portal we call Death

It is instinctive in human nature to believe that the soul lives again after the death of the body. For some of the theories which have had their origin in this belief, see IMMORTALITY; TRANSMIGRATION OF THE SOUL.

What Has Been Said About Death. The last words of some of the most famous men and women in American life throw an interesting light on the question of death. Although varying in their philosophy, most death-bed statements agree in their expression of peace and contentment. The following are illustrative:

John Quincy Adams: It is the last of earth. I am content.

Horace Greeley: It is done.

Cotton Mather. I am going where all tears will be wiped from my eyes.

Louisa M. Alcott: Thus far the Lord has led me on

Gen Lew Wallace. I am ready to meet my Maker.

Henry Thoreau I leave this world without a regret

Cornelius Vanderbilt Yes, yes, sing that for me. I am poor and needy.

Thurlow Weed I want to go home.

Frances E Willard How beautiful to be with God!

John Greenleaf Whittier. I have known Thee all the time

George Washington It is well

Benedict Arnold. Let me die in the old uniform in which I fought my battles for freedom. May God forgive me for putting on any other.

In Literature and Myth. In legend, Death has usually been personified as the great enemy of mankind. Sisyphus, in the old Greek tale, bound Death in chains when he came to bear him away, and no one on earth died until Mars freed the captive. In Italian folklore, Death is tied up in a bag and corked in a bottle by his enemies. A German variation of this tale occurs in the story of Gambling Hansel, who kept Death up a tree for seven years. In Chaucer's *Canterbury Tales*, the story told by the Pardoner relates how three roisterers planned to seek out Death and slay him because he had killed an old comrade of theirs.

Death in its various aspects has been a favorite theme of poets and has inspired many passages of high lyric beauty. It is an interesting fact that poems treating of death nearly always sound the optimistic note, and are more courageous and cheerful in tone than many whose theme is life. This is notably true of such well-known poems as Bryant's *Thanatopsis* (whose title means *contemplation of death*), Browning's *Prospice*, Tennyson's *Crossing the Bar*, and Stevenson's *Requiem*, and it is beautifully illustrated in the following lines from an English poet, William E. Henley (1849-1903)



Photo Keystone

DEATH VALLEY, THE HOTTEST SPOT IN THE UNITED STATES

It is also one of the most torrid regions of the world. On July 10, 1913, the thermometer recorded a temperature of 134°. In the illustration, the tourist is reading a notice on a board set up for the direction of travelers.

So be my passing!
My task accomplished and the long day done,
My wages taken, and in my heart
Some late lark singing,
Let me be gathered to the quiet west,
The sundown splendid and serene,
Death.

B M W.

DEATH ADDER. See ADDER.

DEATH CUP. See MUSHROOMS.

DEATH'S-HEAD MOTH, a moth of the interesting and beautiful family of sphinx, or hawk, so named because of characteristic pale-yellow marks on the back of its thorax. The resemblance of these marks to a skull or death's head has given rise to many superstitious be-

frightens the bees like the "voice" of the queen, so the moth is not killed or sealed up as are other robbers of hives.

The bright-yellow caterpillar of this moth, with its violet stripes and blue spots, feeds on leaves of potato and tomato plants, but is less injurious to agriculture than caterpillars of other species. See MOTH; HAWK MOTH. W.J.S.

Classification. The scientific name of this moth is *Acherontia atropos*.

DEATH VALLEY. The name was first applied to this region by a company of emigrants *en route* in 1849 to California's newly discovered gold fields. Eighteen of a group of thirty adventurers perished in the desert wastes, and to the survivors it seemed indeed the valley of death.

This desolate, sandy plain, about 150 miles long and thirty-five miles wide, is in Inyo County, Calif., close to the border of Nevada. The plain is about 210 feet below the level of the sea, and is destitute of vegetation, with the exception of cacti and greasewood. The Panamint mountain range encloses it on the west and shuts out the Pacific winds. The Amargosa and Funeral mountains, the latter suggesting its tragic story, constitute its eastern boundary, and volcanic ranges of a brown, yellow, black, and red color make up the surrounding country.

These ranges furnish a good deal of the borax used for commercial purposes (see BORAX). Summer heat rises frequently to 130° F., and on the mountain summits in the winter the thermometer often falls to 30° below zero. There is little animal life except the crow, buzzard,

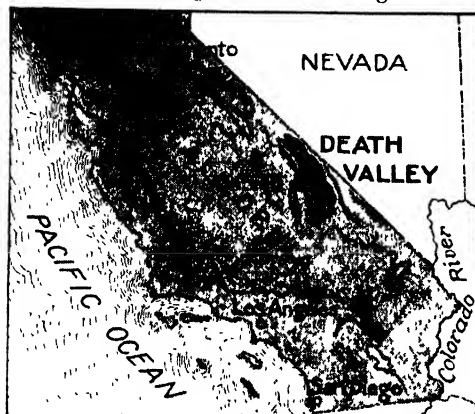


DEATH'S-HEAD MOTH

This insect is frequently one-half larger than the illustration.

liefs. The moth has a thick, hair-covered body, and wings that are strong, but soft and downy, and measure four or five inches across. The fore wings are brown, spotted, and marked; the hind ones are yellow, with two black bands. This beautiful night-flying creature often enters beehives for honey. There its squeaking noise

horned toad, jack rabbit, and rattlesnake. The wealth of the valley is purely mineral, quartz rich in gold having been found along the trail



LOCATION OF DEATH VALLEY

taken by the old emigrant parties, the "40-ers." Silver, copper, and lead have been found in paying quantities, and colemanite, taking its name from its discoverer, W. T. Coleman, has been found rich in borax. Human society in this valley consists principally of roving bands of Piute Indians and a few miners. Tourists should not attempt to cross this valley earlier than October nor later than April. See CALIFORNIA (Surface Features); TEMPERATURE. R.H.W.

DEATHWATCH, a name given to several species of small brownish beetles that have the peculiar habit of knocking their heads against wood and producing a peculiar ticking or rapping sound. Superstitious people sometimes believe that the rapping, heard in the quiet of the night, foretells death in the house in which it is heard. The beetles burrow into furniture and woodwork and are often very destructive. The "drug-store beetle," which feasts on drugs stored in shops, is also called deathwatch. The grub, or larva, of the common deathwatch is a voracious eater of books (see BOOKWORM). W.J.S.

DEBATE. Chaucer, Spenser, and other early English writers used the word *debate* in the sense of *fight* or *quarrel*, and Shakespeare, in one passage, speaks of men "debating with the sword"; but the term now has an entirely different meaning. While two speakers or sets of speakers who are formally discussing a question battle with words to prove their points and disprove those of their opponents, they are not disputing or quarreling; they are systematically arguing, and are making an appeal to reason, not to prejudice, sentiment, or the emotions. They are *debating*.

Debate differs from the informal and formless discussion of public questions heard around the dinner table, or in places where people

of leisure congregate, in that it is *organized argument*. The speakers are armed with facts on both sides of the question; they present their points in logical order; they are prepared beforehand to shatter the arguments brought up by the opposite side. The main purpose of a debate is to bring out the truth. A favorable decision won by trickery and not by strength of argument is a hollow victory.

Why Debating is Beneficial. Participation in debates gives excellent training in self-control. The good debater must school himself to keep his temper and to overcome diffidence before an audience; he must forget himself and keep his mind on the points at issue. Debating trains one to meet emergencies promptly and to think quickly, and this in turn demands preparation. To meet an opponent's arguments, a debater must have his knowledge systematized and his facts ready to be presented at a moment's notice. Those who become experienced in debate learn to express their ideas in clear, exact language; their judgment is trained, and their faculty for constructive thinking is developed. Not the least valuable of the results obtained from practice in debating is the ability it gives one to detect false and inconsistent reasoning. The mind schooled to think clearly and logically will not be misled by false arguments and misapplied facts.

What to Debate. Appropriate subjects for debate are to be found in every branch of human knowledge, but not all questions are debatable. A subject for debate must admit both of affirmation and denial; that is, it must not be all one-sided, nor so neutral that no decision can fairly be reached for one side or the other. The following is an example of a one-sided subject: *Resolved, That Shakespeare was a greater poet than Longfellow*. Shakespeare's supremacy is so obvious a fact that the negative side of this question could not well be sustained. Or, suppose the subject should read, *Resolved, That Shakespeare was a greater poet than Dante*. Here the opposite sides are too evenly balanced, for it is generally admitted that these two poets are practically equal in greatness.

A subject should be stated so that the limits of the question will be exactly and clearly defined. If the subject for debate be the restriction of immigration, it should be definitely stated what immigrants are referred to. It is evident that a law which applies to the Chinese, for instance, could not fairly be applied to immigrants from Europe.

Suggested Topics for Debate. Any topic for debate may be stated as a fact, as in the examples given above, or as a question. Subjects drawn from various fields, all of which are suitable, are contained in the following list:

1. Should Latin and Greek be studied in the high school?

2. Is censorship of motion pictures desirable?

3. Would American cities be justified in enforcing a curfew law to keep young people off the streets at night?

4. Has the primary election been a force for good in American politics?

5. Should the United States Constitution be amended to make each new administration immediately follow the Presidential election?

6. Is compulsory arbitration of labor disputes wise and feasible?

7. Are women entitled to draw equal salaries with men performing the same service in the same occupations?

8. Would the creation of a separate Department of Education be beneficial to public education in America?

9. Has science done more for the progress of mankind than religion?

10. Was the United States justified in refusing to join the League of Nations?

11. Does the maintenance of strong armies and navies help to promote war?

12. Would the proposed change in the calendar be desirable?

13. Should Great Britain and America adopt the metric system of weights and measures?

14. Would government ownership of coal mines benefit the public, the miners, and the industry?

15. Is too much emphasis placed on college athletics?

16. Are twentieth-century conditions more conducive to the development of character than those of the Revolutionary period?

17. Is the recall of public officials a wise political device?

18. Should vivisection be prohibited by law?

19. Should the United States government create a price-fixing board to stabilize prices of farm products?

A debate is always opened by the first speaker for the *affirmative* side, who states the question clearly and then presents his arguments. The first speaker for the *negative*, who follows, seeks to refute the arguments of the previous speaker, and he also advances arguments of his own. He is followed by the second speaker for the affirmative, and so on, until all have presented their points. Finally, the first debater is given a few moments for closing arguments.

A Debate Outlined. A topic of present-day interest, and one which is suitable for school debating societies, is here submitted, together with the arguments for the affirmative and negative sides of the question.

Resolved, That the city-manager form of municipal government should be adopted by American cities.

Affirmative

I. The city-manager plan is a necessary substitute for the older form of municipal government, which James Bryce characterized as the "one conspicuous

Negative

I. The adoption of the city-manager plan is not necessary under present conditions.

A. Not only have conditions steadily improved since the beginning of the

failure of the United States."

A. The defects in American city government are so outstanding as to call for a drastic remedy. These defects may be summarized as follows:

1. The mayor-council system is inefficient.

a. In public business as in private enterprises, there must be concentration of responsibility. The separation of powers, resulting from the placing of authority jointly in the hands of mayor and council makes for incompetency and waste.

b. Selecting executive and administrative officers by popular vote permits and encourages the election of corrupt and inefficient officials, and is obviously wrong in theory.

c. The short term for administrative officials, who are dependent on political manipulation for their return to office, seriously interferes with any attempt to govern honestly and competently. It is one of the most serious defects of the older system.

2. Under the mayor and council plan most American cities are boss ridden, controlled by political machines and preyed on by grafters. Enormous expenditures, mounting debts, and increasing taxes are the result of this union of politics and government. The city-manager plan eliminates politics, for the commission which selects the manager is elected by the people on a nonpartisan basis.

present century, but they will continue to improve as we get the full benefit of such modern movements as woman suffrage, national prohibition, higher standards in politics, and better methods in public education. The negative further maintains that:

1. The mayor and council system has, in the main, given satisfactory results, and is the plan best adapted to American conditions.

a. The separation of the executive and legislative powers is a basic principle of American government. There must be checks and balances in the administration of a city, as in that of the states and of the nation. A city is administered for the good of all the people, and is not run for profit, as is a private business corporation.

b. Electing the mayor and council by popular vote is the wisest method of selecting these representatives.

(1) The elective mayor feels a direct responsibility and must give an accounting to the voters themselves.

(2) In the elective council, each section of the city and each group of citizens may have a direct voice.

B. The city-manager plan does not bring about greater permanence in the office of the chief executive.

1. Records show that commissions which control the appointment of managers are as fickle as bodies of voters.

2. No city need expect to remedy corrupt conditions merely by a change of form. The evils which have characterized American city governments are due mainly to the following causes:

a. Lack of municipal home rule through fault

of the charter or the state constitution

b. Corrupting influence of public utilities.

c. Injection of national and state politics into city affairs

d. Tolerance of the spoils system

e. Indifference of the better class of voters

f. Low standards of the public press

Elimination of these evils, and not a change of system, is the real solution

II The city-manager plan is wise and desirable.

A It provides a remedy for the evils enumerated above

1 Under the city-manager plan, responsibility is concentrated in the hands of one man, hired as a business executive and vested with authority to appoint heads of departments on the basis of ability and experience, not on that of patronage. This plan makes for efficiency, economy, and honesty

2 The elimination of popular elections as carried on under the older system will bring about a higher standard of service by preventing the elevation to power of dishonest and incompetent men.

B. The city-manager plan is theoretically sound

1. Its main features are used in successful business enterprises

2. It has the good points of the commission form of government and none of its weaknesses

3 The public interests may be adequately safeguarded by the initiative, referendum, and recall

II The city-manager plan is unwise and undesirable

A The system is un-American and dangerous

1 Centralization of power in one man does away with the sound American policy of dividing responsibility between the executive and legislative departments. Furthermore, it is a dangerous policy to clothe with extensive power a man not directly responsible to the people, nor dependent on them for his tenure of office

2 Popular elections are the foundation stone of American democracy. The appointed manager, whose tenure of office depends on the whims of a commission, is apt to become a trimmer. Indirect elections have always been unsatisfactory in America.

B. The city-manager plan is wrong in principle.

1 Any free body of voters should be very slow to relinquish the right of electing their own governing agencies

2 Appointment of the chief executive is too great a responsibility to lodge in the hands of any small group of men

3. The only safeguards of municipal liberty are direct elections, definite fixing of responsibility, and retention of representative legislative bodies and elected executive. The city-manager

III. The city-manager plan is practicable, and its adoption has been justified by experience.

A. The plan of organization has been successful:

1 In the government of German cities.

2. In all American cities that have given it a fair trial, including such important municipalities as Cleveland and Dayton (Ohio)

B The plan has been a constructive force in the development of municipal government and has created a new profession—that of city manager.

C. The plan is growing in favor.

1 The number of cities adopting it has steadily increased.

2. Large municipalities are studying its possibilities

3 It has been endorsed by such eminent authorities as:

a. Augustus R. Hatton, author of the Cleveland charter

b General Goethals, builder of the Panama Canal.

c Richard S Childs, publicist

d. Woodrow Wilson

plan eliminates these safeguards.

III. The city-manager plan is not practicable, and experience has shown that it has grave weaknesses.

A That it has been adopted by numerous American cities is true, but over thirty of these have abandoned it. They include River Forest, Ill., Hot Springs National Park, Ark.; Waltham, Mass; Lawton, Okla. In one year alone, forty cities rejected the plan when submitted to the voters for approval.

B. In no case has the plan been as successful as its sponsors claimed it would be

C Just as many of the evils of city government are due to other causes than the mayor and council system, so many improvements claimed as effects of the city-manager plan are the result of an enlightened public conscience and higher standards in politics

D. Experience has shown that the adoption of the new plan has resulted in a loss in civic spirit and a falling off of public interest in municipal affairs

DEBATING SOCIETY, RULES FOR. See PARLIAMENTARY LAW.

DEBENTURE, *de ben' ture*, BOND. See BOND.

DEBORAH, *deb' o rah*, a prophetess of Israel during the period of the Judges. Women, in all the world's history, in pointing to others of their sex who have accomplished notable things and have shown themselves capable in public affairs, never fail to mention Deborah. She was known as a "mother in Israel." In a campaign to deliver Israel from the Canaanites, whose yoke had been endured for twenty years, she joined Barak, the leader of the northern tribes of Israel, and together they destroyed the army of the Canaanites in the "plain of Esdraelon." The Canaanite leader, Sisera, fled, and was murdered in his sleep by Jael, wife of Heber the Kenite. Then "the land had rest for forty years." *Judges v* gives the Song of Deborah, telling of joy over the nation's

deliverance, which is considered one of the finest poems in the Old Testament.

DEBRECZEN, *deb' reh tsen*. See HUNGARY (Principal Cities).

DEBS, EUGENE VICTOR (1855-1926), a radical American Socialist, who was several times a candidate for President of the United States on the Socialist ticket, and known as an advocate of the rights of laboring men. He was born in Terre Haute, Ind., was educated in the common schools and began life as a locomotive fireman on the Terre Haute & Indianapolis Railroad. He next sold groceries for a wholesale house. From 1879 to 1883 he held office as city clerk of Terre Haute, and in 1885 entered the Indiana legislature. Eight years later, Debs organized the American Railway Union, which under his leadership won an important strike on the Great Northern Railway in 1904.



Photo U & U

EUGENE V. DEBS

He was also the prime mover in the great tie-up of Western railroads centering in Chicago, in 1904, which was broken by the interference of the Federal courts and by the vigorous measures of President Cleveland, who employed soldiers to move the mails. In July of that year, he was arrested on a charge of violating a Federal injunction in connection with the strike, and was sentenced to six months in jail. While he was serving his term, he was visited by a Socialist leader, and from that period dates his activity as a member of the Socialist party. He was its Presidential candidate in 1904, 1908, and 1912. In 1919 he was imprisoned on a ten-year sentence for anti-war activities, but his sentence was commuted on Christmas Day, 1921.

DEBT, *det*, is that which is due; more strictly, it is a sum of money due from one person to another. Originally, the law regarded as a debt only those claims based on a definite, expressed agreement. This narrow view has long been abandoned, and a debt is now regarded as "all that is due a man under any form of obligation or promise." A debt, therefore, may be created by a special contract or by an ordinary business transaction.

If the debtor—the person who owes money—is unwilling or unable to pay the debt, the creditor may bring suit to recover his money. This is a *civil suit* (a suit of one citizen against another), and ordinarily results in a *judgment* in favor of the plaintiff, and the debtor usually

has to pay the costs of the suit. If the court decides that the defendant does not really owe the alleged debt, the costs must be paid by the plaintiff. If the debtor fails to pay after judgment has been rendered against him, the creditor may appeal to the sheriff for an *execution* of judgment, and may seize enough of the debtor's property to pay the debt and the costs of the process. In all states and provinces, some of the debtor's property is exempt from seizure; this exemption ranges from a house and lot owned by the debtor and used as a homestead to a small amount of personal property, if the debtor be married; the exemption ranges from about \$400 to as much as \$1,000.

Statute of Limitations. Ordinarily, the courts assert that a debtor should pay his debts, even though the creditor does not demand payment. The obligation rests on the debtor. On the other hand, if the creditor makes no effort to collect the money within a certain number of years, the debt is said to be *outlawed* by the *statute of limitations*. If a creditor makes no effort to obtain payment within a reasonable time, the law assumes that there may have been a good reason for not doing so, and gives the debtor the benefit of the doubt by relieving him of the debt. The accompanying tables show the number of years a debt may run in the United States and Canada before it is outlawed.

STATUTE OF LIMITATIONS IN CANADA (Years)

PROVINCE	Judgments	Notes	Open Accounts
Alberta	12	6	6
British Columbia	20	6	6
Manitoba	10	6	6
New Brunswick	20	6	6
Nova Scotia	20	6	6
Ontario	20	6	6
Prince Edward Island	20	6	6
Quebec	30	5	5
Saskatchewan	12	6	6
Yukon ..	12	6	6

Imprisonment for Debt and Other Penalties. The laws regarding debtors have changed greatly with the progress of the ages. In ancient times the debtor was handed over to the mercy (usually far from tender) of his creditors; in Greece, in Rome, among the Jews, and even in England under the Saxons, the debtor became in name and in fact the slave of his creditors. During the Middle Ages, the man who was unable to pay his debts received more leniency. Every man was primarily a soldier, and his services were at the call of his overlord. In such a system, it was impossible to allow imprisonment for debt to break up an army. As the feudal system declined

STATUTE OF LIMITATIONS IN THE UNITED STATES

STATES AND TERRITORIES	STATUTES OF LIMITATIONS			STATES AND TERRITORIES	STATUTES OF LIMITATIONS		
	Judgments, Years	Notes, Years	Open Accounts, Years		Judgments, Years	Notes, Years	Open Accounts, Years
Alabama	20	6 (a)	3	Montana	10	8	5
Alaska	10	6	6	Nebraska	5	5	4
Arkansas	10	5	3	Nevada	6	6	4
Arizona	4	4	3	New Hampshire . .	20	6	6
California	5	4	4	New Jersey	20	6	6
Colorado	20	6	6	New Mexico	7	6	4
Connecticut	(j)	6	6	New York	20 (s)	6	6 (c)
Delaware	10 (h)	6	3	North Carolina . .	10	3	3
District of Columbia.	12	3	3	North Dakota . . .	10	6	6
Florida	20	5	3	Ohio	21	15	6
Georgia	7	6	4	Oklahoma	5	5	3
Hawaii	20	6	6	Oregon	10	6	6
Idaho	6	5	4	Pennsylvania	5 (k)	6 (b)	6
Illinois	7	10	5	Porto Rico	5	3	3
Indiana	20	10	6	Rhode Island	20	6	6
Iowa	(f)	10	5	South Carolina . . .	10	6	6
Kansas	5	5	3	South Dakota . . .	20	6	6
Kentucky	5	15	2	Tennessee	10	6	6
Louisiana	10	5	3	Texas	10	4	2
Maine	20	6	6	Utah	8	6	4
Maryland	12	3	3	Vermont	6	6	6
Massachusetts . . .	6 (e)	6	6	Virginia	20	5	3
Michigan	10	6	6	Washington	6	6	3
Minnesota	10	6	6	West Virginia . . .	10	10	5
Mississippi	7	6	3	Wisconsin	20 (d)	6	6
Missouri	10	10	5	Wyoming	10	10	8

(a) Under seal, 10 years (b) Under seal, 20 years (c) Six years from last item. (d) Justice court judgments, 6 years (e) Witnessed, 20 years (f) Twenty years from time when new suit may be brought, which is 15 years after first judgment (g) Ceases to be a lien after the period, unless revived. (h) Subject to renewal. (i) Not of record, 6 years (j) No limit.

and trade and industry became more important, the debtor was again subjected to harsh treatment. The uncertainties of business made it necessary to keep a strong check on debtors, and imprisonment was the usual penalty for delinquent debtors. Imprisonment, however, seldom brought the creditor the money he wanted, and the debtors' prison gradually became recognized as a blot on the penal system.

Imprisonment for debt is still allowed in nearly all countries, including Great Britain, Canada, and the United States, but only in such exceptional cases as involve fraud, false pretenses, or other statute offenses. For ordinary debtors the terrors of prison are no more. The writings of Charles Dickens played an important part in teaching the English-speaking world the horrors and the uselessness of the debtors' prison. Imprisonment for debt, with a few exceptions, was abolished in France in 1867, in England in 1869, in Belgium in 1871, in Ireland in 1872, in Switzerland in 1874, and in many other countries since then. In the United States, such imprisonment has been abolished by the statutes of the individual states. (See BANKRUPT). E.J.

DEBT OF THE UNITED STATES. See NATIONAL DEBT, subhead.

DECALOGUE, *dek' a lahg*, the TEN COMMANDMENTS, comprising the whole moral law, which, according to the Old Testament, were "written with the finger of God" on two tables of stone and given to Moses on Mount Sinai. The text and application of all versions are practically the same, but the division varies in different churches. The arrangement commonly adopted by Protestant bodies is found in *Exodus* xx, 3-17. The Roman Catholic arrangement combines the first and second commandments and divides the tenth into two. The Hebrews called these precepts the "ten words."

The Greeks adopted the name *decalogue*; the Greek *deca* means *ten*, and *logos*, a word.

DECAMERON, *de kam' ur on*, a collection of tales by Boccaccio (which see).

DECATUR, *de ka' tur*, ILL., named for Commodore Decatur, is the county seat of Macon County. It is situated on the Sangamon River, in the central part of the state, thirty-eight miles east of Springfield and 173 miles

southwest of Chicago. Population, 1928, 57,100 (Federal estimate).

Decatur was settled in 1830, and was incorporated in 1836. The organization of the Grand Army of the Republic occurred at Decatur with the creation of Post 1 on April 6, 1866. Near the city is Lake Decatur, a fine body of water fourteen miles long. Decatur is the seat of James Millikin University (Presbyterian), a coeducational school founded in 1901, the Decatur College of Music, and an Art Institute.

Railroads. The city is on the Wabash, the Illinois Central, the Baltimore & Ohio, and the Pennsylvania railroads. The Illinois Traction System operates electric service to Springfield, Peoria, Bloomington, Champaign, and other cities, and there are also motorbus lines.

Industry. Excellent railroad accommodations have given Decatur a large trade in the produce of the surrounding agricultural country. The city is in the great coal region of Illinois. There are about 135 manufacturing plants, making iron products, plumbing supplies, water-works equipment, electric-light fixtures, soda fountains, corn shellers, hominy, corn meal, corn flour, and starch. The principal repair shops of the Wabash Railroad are here

DECATUR, STEPHEN (1779-1820), one of the most daring officers in the American navy during the early period of its history.

On the night of February 16, 1804, Decatur took a small vessel, the *Intrepid*, with a picked band of Americans, into the harbor of Tripoli, set fire to the frigate *Philadelphia*, which had been captured by Tripolitan pirates, and under a fierce fire from the enemy's batteries made his way back to the fleet, stationed at Syracuse; not a man was killed and only one was wounded. This act, pronounced by the English Admiral Nelson to be the "most daring of the age," won him a sword of honor and appointment as captain.

In 1798 Decatur enlisted in the navy as midshipman, was promoted to the rank of lieutenant the following year, and in 1803, during the war with Tripoli, took command of the *Enterprise*, of the Mediterranean squadron.

Early in the War of 1812, while commanding the *United States*, Decatur captured the British frigate *Macedonian*, after a desperate struggle. In 1813 he was given the honorary title of commodore and placed in command of a squadron in New York harbor. In January, 1815, while attempting to run the British blockade, his flagship, the *President*, struck on the bar at Sandy Hook and became disabled. Decatur, forced into a fight against heavy odds, was finally compelled to strike his colors and was taken a captive to Bermuda.

He was soon paroled, and in the same year took command of the operations against Algiers, Tunis, and Tripoli, forcing those countries to respect the rights

of other nations on the Mediterranean (see BARBARY STATES). On his return to the United States, he was made navy commissioner, and held this office until his death, which occurred in a duel with Commodore James Barron, the latter having challenged him on the ground that he was persecuted by a cabal of officers headed by Decatur. See BARRON, JAMES.

Particularly famous is Decatur's "toast":

"Our country! In her intercourse with foreign nations, may she always be in the right; but, our country, right or wrong."

Decatur belongs to the group of naval heroes of the young republic which included John Barry, John Paul Jones, William Bainbridge, Thomas McDonough, and Isaac Hull. These men and others only a little less famous laid the foundations of the naval tradition of the United States.

DECCAN, dek' an. See INDIA (The Land).



Photo. Brown Bros.

STEPHEN DECATUR

This illustration, from an old painting, shows naval costume of the period, and presents an idea of the deck of a man-of-war in early American history.

DECEMBER CALENDAR

Birthdays

3. Gilbert Stuart, 1755
George B. McClellan, 1826
4. Thomas Carlyle, 1795
5. Martin Van Buren, 1782
George A. Custer, 1839
6. John S. Mosby, 1833
7. Mary, Queen of Scots, 1542
8. Eli Whitney, 1765
Henry Timrod, 1820
Joel Chandler Harris, 1848
9. John Milton, 1608
10. William Lloyd Garrison, 1805
Edward Eggleston, 1837
12. John Jay, 1745
John S. Macdonald, 1812
13. Phillips Brooks, 1835
14. Tycho Brahe, 1546
Sir Francis Hincks, 1807
15. George Romney, 1734
16. Jane Austen, 1775
17. Ludwig von Beethoven, 1770
Sir Humphry Davy, 1778
John Greenleaf Whittier, 1807
18. Lyman Abbott, 1835
Edward A. MacDowell, 1801
19. Gustavus Adolphus, 1591
Edwin M. Stanton, 1814
20. Cyrus Townsend Brady, 1861
21. Thomas à Becket, 1117
Benjamin Disraeli, 1804
22. James E. Oglethorpe, 1696
24. Christopher ("Kit") Carson, 1809
25. Sir Isaac Newton, 1642
Clara Barton, 1821
26. Thomas Gray, 1716
27. Johann Kepler, 1571
Sir Mackenzie Bowell, 1823
28. Woodrow Wilson, 1856
29. William E. Gladstone, 1809
30. Alfred E. Smith, 1873

Events

1. Hudson's Bay Company transferred government rights to the Dominion, 1869
2. Napoleon crowned emperor of France, 1804
Battle of Austerlitz, 1805
Monroe Doctrine advanced in President Monroe's message to Congress, 1823
Austrians occupied Belgrade, 1914
3. Battle of Hohenlinden, 1800
Illinois admitted to the Union, 1818
5. England established uniform postal rate for letters, 1839
Rome was made the capital of Italy, 1870
6. Columbus discovered Haiti, which he named Hispaniola, 1492
Jefferson Davis died, 1889
German forces captured Bucharest, capital of Rumania, 1916
7. Cicero assassinated, 43 B. C.
8. Americans began siege of Quebec, 1775
Chinese adopted Roman calendar, 1911
British won naval victory off Falkland Islands, 1914
9. Confederation formed by Australian colonies, except New Zealand and New South Wales, 1885
10. Mississippi admitted to the Union, 1817
Sherman's army took Savannah, Georgia, 1864
Wyoming women authorized to vote and hold office, 1877
11. Indiana admitted to the Union, 1816
12. Fort George, in Canada, abandoned by the United States, 1812
Sherman's army completed its march to the sea, 1864
Japanese invaded Korea, 1894
Delhi made capital of India, 1911
13. Sir Francis Drake left England to sail around the world, 1577
Federals defeated at Fredericksburg, 1862
14. George Washington died, 1799
15. Hartford Convention assembled, 1814
Alabama Claims Commission convened at Geneva, Switzerland, 1871
16. Oliver Cromwell declared Lord Protector for life, 1653
"Boston Tea Party," 1773
17. Milan Decree issued, 1807
18. Russian squadron entered Port Arthur, 1897
Egypt proclaimed a British protectorate, 1914
20. Texas declared itself independent of Mexico, 1835
21. Pilgrims landed at Plymouth, Massachusetts, 1620
22. Sino-Japanese treaty signed, 1905
24. Methodist Episcopal Church in America organized, 1781
Treaty of Ghent signed, 1814
25. Washington and his men crossed the Delaware, 1776
26. Battle of Trenton, 1776
28. Spain recognized Mexican independence, 1836
Iowa admitted to the Union, 1846
Women given permission to practice in law courts of Canada, 1892
29. Thomas à Becket assassinated, 1170
Texas admitted to the Union, 1845
First American Y. M. C. A. established in Boston, 1851
30. Gadsden Purchase arranged, 1853
31. Palmetto flag of South Carolina raised over United States arsenal at Charleston, South Carolina, 1860

For Study

Chickadee
Christmas
Electricity
English Sparrow
Fir

Gas
Holly
Ice
Mistletoe
Nuts

Orange
Pop corn
Squirrel
Winter heavens (see
ASTRONOMY)

DECEMBER QUOTATIONS

1. December drops no weak, relenting tear,
By our fond summer sympathies ensnared,
Nor from the perfect circle of the year
Can even winter's crystal gems be spared.
Cranch.
2. I hold it true with him who sings
To one clear note in divers tones
That men may rise on stepping-stones
Of their dead selves to higher things
Tennyson.
3. Politeness has been well defined as benevolence
in small things.
Macaulay.
4. Literature is the thought of thinking souls
Carlyle
5. Blow, blow, thou winter wind,
Thou art not so unkind
As man's ingratitude
Thy tooth is not so keen,
Because thou art not seen,
Although thy breath be rude.
Shakespeare.
6. Theirs not to reason why,
Theirs but to do and die.
Tennyson.
7. The very perfection of manners is not to think
about yourself.
Whately.
8. All work, even cotton-spinning, is noble; work
is alone noble.
Carlyle.
9. Thousands at his bidding speed,
And post o'er land and ocean without rest,
They also serve who only stand and wait
Milton.
10. Our country is the world; our countrymen are
mankind.
Garrison
11. The stars are glittering in the frosty sky,
Numerous as pebbles on a broad seacoast.
Heavysege.
12. Nature does well whatever task she tries
Because *obedient*—there the secret lies.
Smith.
13. Good manners is the art of making those people
easy with whom we converse
Swift
14. The sweeping blast, the sky o'ercast,
The joyless winter day,
Let others fear, to me more dear
Than all the pride of May
Burns.
15. To obey is better than sacrifice, and to hearken
than the fat of rams.
I Samuel xv, 22.
16. Politeness is to do and say
The kindest thing in the kindest way.
17. I know not where his islands lift
Their fronded palms in air;
I only know I cannot drift
Beyond his love and care.
Whittier.
18. When another speaks be attentive yourself and
disturb not the audience.
Washington.
19. A moral, sensible and well-bred man
Will not affront me, and no other can.
Cowper.
20. The soldier who executes his captain's com-
mands is no less valuable than the captain
who gives the order.
Cervantes.
21. Wild was the sky, the wintry sea
Moaned sadly on New England's strand,
When first the thoughtful and the free,
Our fathers, trod the desert land
Bryant
22. Ay, call it holy ground,
The soil where first they trod,
They left unstained what there they found—
Freedom to worship God
Hemans.
23. Obedience alone gives the right to command.
Emerson.
24. But peaceful was the night
Wherein the Prince of light
His reign of peace upon the earth began
Milton.
25. I heard the bells on Christmas Day
Their old, familiar carols play,
And wild and sweet
The words repeat
Of peace on earth, good-will to men.
Longfellow.
26. The boast of heraldry, the pomp of power,
And all that beauty, all that wealth e'er gave,
Await alike the inevitable hour—
The paths of glory lead but to the grave
Gray.
27. Heap on more wood!—the wind is chill,
But let it whistle as it will,
We'll keep our Christmas merry still.
Scott.
28. Let thy child's first lesson be obedience, and
the second will be what thou wilt
Franklin.
29. To the cold December heaven
Came the pale moon and the stars,
As the yellow sun was sinking
Behind the purple bars
Shanly
30. Cap in hand never harmed anyone.
Italian Proverb.
31. Good-bye, kind year; we walk no more together,
But here in quiet happiness we part;
And from thy wreath of faded fern and heather,
I take some sprays, and wear them on my heart
Doudney.



DECEMBER, the twelfth and last month of the year. The *decem* of its name, so familiar to the Latin student, seems strange as applied to this month, for it means *ten*; but in the old Roman days, before the reform of the calendar, December was the tenth month, and March, the first. Later, when two months were added, the numerical significance of its name had been somewhat lost sight of; at any rate, no learned Roman thought it of enough importance to call for correction. One alteration occurred, however, for centuries December had had but twenty-nine days, but Caesar added two, making it one of the longest months. The holly is the special flower of this month, and its gem is the turquoise. See CALENDAR; also pages 1857, 1858.

December's Place in the Year. The first of December is generally considered to begin the winter season, but in reality winter does not commence until December 22, the day on which the sun reaches the solstice (see SOLSTICE) and turns back for its northward journey. In the northern hemisphere, that is the shortest day of the year; in the southern hemisphere, the longest, though for a month thereafter there is little perceptible change in the length of the days. Though December is frequently spoken of as the "frosty month" or the "icy month," it is not usually the coldest of the winter months, nor is it the most cheerless, for the good will, the crackling fires, and the holly of approaching Christmas seem to shed a glow over all. The Romans made Vesta, goddess of the hearth, the special deity of December, and this seems appropriate, for there is no time when hearth fires have a greater significance. See VESTA.

The great Christian festival of Christmas (which see), celebrated on the twenty-fifth, is the chief holiday of the month; indeed, to the children at least, it is the chief holiday of the year. The thirty-first, the last day of the year, is known as New Year's Eve, and often partakes of the festivities with which the opening of the new year is celebrated. New

England has set apart the twenty-first for special reverence, and calls it Forefathers' Day. On that day the Pilgrims, that "band of exiles," "moored their bark on the wild New England shore," and began to make history that still influences the entire country.

December Out-of-Doors. This is one of the months in which Nature seems to be resting, for of the manifold activities of summer and autumn, there remains scarcely a trace. This does not mean that the month has no interesting out-of-door phases. There are the hardy evergreen trees and the holly—how are they able to live when other plants seem practically dead? Why has not the cold driven away the English sparrows and the chickadees, with most of the other birds? There are wonderful "Jack Frost" traceries to be studied on the windows, and beautiful snow crystals to be examined under the microscope, and there are all the strange achievements of the cold. Why is not the ice in the brook as rippled as is the water in summer time? Since cold contracts, why does the frozen milk push its way up out of the bottle, and why does freezing water crack a pitcher? The child will do well to interest himself in such studies as these in this winter month, for it is even more necessary than in the summer that he should have plenty of out-of-door air, since homes are not likely to be as well ventilated as in the open-door and open-window season.

DECEMVIRS, *de sem' vurz*, a term which might be applied to any official body of ten men (from *decem*, meaning *ten*), but having specific reference to the ten magistrates appointed in 451 B.C., with absolute powers for one year, to systematize the laws of Rome. The first commission governed with wisdom and moderation, but its successors were extremely unpopular, their violence and despotism leading to an insurrection and the abolishment of the office in 449 B.C. See ROME (Early Days of the Republic); TWELVE TABLES, LAW OF THE.

DECIDUOUS HOLLY. See WINTERBERRY.

DECIDUOUS, *de sid' u us*, **TREES**, those trees which lose and renew all their leaves each year at definite seasons, as the oak, ash, beech, birch, elm, and many others which are familiar to everyone. The term *deciduous* is from Latin words which mean *something which falls down*. In temperate countries, most deciduous trees lose their leaves in the autumn, leaving twigs and branches bare in winter; in the spring, they don a new garb of green. The fall of the leaf is necessary for the conservation of water. During the leaf-bearing period, the leaves are constantly transpiring the sap that rises from the roots. During the cold season, very little soil-water can be absorbed by the roots, and if the leaves remained on the trees, so much water would be given off that the plants would dry up and perish. Broad-leaved trees would also accumulate a load of ice and snow, and the branches would break down if the trees kept their summer foliage (see **LEAVES**). The actual fall of the leaf is the result of the formation of a special layer of cells where the leaf joins the twig. This weakens the mechanical strength of the leaf, and any unusual weight or force, as a brisk wind, will cause it to drop off.

The name *evergreen* is applied to trees that have a covering of leaves the year around. Such trees do shed their leaves, but they do not lose all of them at a particular time. See **EVERGREEN**; **FORESTS AND FORESTRY** (Kinds of Forests).

G.M.S

DECIMAL FRACTIONS. United States money is a familiar example of a decimal system. When we write \$.08 and \$.35 we understand that since there are 100 cents in a dollar these sums are $\frac{8}{100}$ of a dollar and $\frac{35}{100}$ of a dollar, respectively. The difference between a common fraction and a decimal fraction is here clearly shown. In writing a common fraction, the denominator is expressed in figures, but any fraction with a denominator of 10 or a multiple of ten may be written by using the decimal point without writing the denominator. In that case, the denominator may be said to be understood.

This way of writing fractions may be applied to other things than money. Thus, .03 oz. is one way of writing $\frac{3}{100}$ oz.; .3 ft. is one way of writing $\frac{3}{10}$ ft.

Our system of writing numbers is also a decimal system. (For a full discussion of this, see **NOTATION**.) Since a clear understanding of our decimal notation is essential to an intelligent attack upon decimal fractions, a short review of it is given here.

Place value is the idea underlying the system of notation. The number expressed by

222 is $200 + 20 + 2$. The value of b is 10 times as great as that of c ; the value of a is 10 times as great as that of b . A digit represents so

many *ones*, or so many *tens*, or so many *hundreds*, and so on, according to the column, or "place," it occupies. Read the lettered

digits, giving their full number values: 7886; a reads 800; b reads 80. b is $\frac{1}{10}$ as large as a .

In the expression 6444, a reads 400; b reads 40; c reads 4; c is $\frac{1}{10}$ as great as b ; b is $\frac{1}{10}$ as great as a .

Much of this reading should precede the study of decimal fractions, and there should also be work such as the following: Read the underlined, giving full value: 7836; 9248; 4924; 73026. They read 800, 30; 9000, 40; 4000, 4; 3000, 20.

Read, giving full value to each part, and write as you read, indicating this full value: $7936 = 7000 + 900 + 30 + 6$. Write in column form.

$$\begin{array}{r} 7000 \\ 900 \\ 30 \\ 6 \\ \hline 7936 \end{array}$$

It took the human race about twelve centuries to take the step from writing *whole numbers* in a decimal system to writing *fractions* in the same system. The decimal fraction appeared in the sixteenth century, and it was not until the eighteenth that it was recognized in the schools. The nineteenth century brought it into somewhat general use, but the early twentieth century saw it supplanting, generally, the common fraction in the scientific and industrial world.

Let us examine the method of transition from the decimal notation applied to whole numbers, to the same applied to fractions. In

the expression $\frac{111}{100}$, c is $\frac{1}{100}$ of b ; b is $\frac{1}{100}$ of a . It is desired to write a number which is $\frac{1}{100}$

of c . Place 1 to the right of c and have $\frac{1111}{1000}$; by this transaction the original number $\frac{111}{100}$ is changed to $\frac{1111}{1000}$; that is, c has changed from 1 to 10, and b from 10 to 100 and a from 100 to 1000. But we wish to write a number that is $\frac{1}{100}$ of c , and not change the value of the original number $\frac{111}{100}$. How can it be done? In other words, how can we write $\frac{111}{100}$, using the decimal system employed in writing whole numbers? Here are several of the ways used in the sixteenth and seventeenth centuries:

$$\begin{array}{c} 01 \\ 111|1; 1111, 1111, 111 \bar{1}, 111 \bar{1}; \\ 01 \end{array}$$

and there were other methods. Below are given some illustrations of decimals, whole and fractional, as they appeared in the early days of decimal fractions:

$$7186 \overline{)847}; 7186 \overline{)847}, 7186847, 71869847, 718698473;$$

each reads seven thousand one hundred eighty-six and eight hundred forty-seven thousandths, although the early writers read the fractions at first 8-tenths, 4-hundredths, 7-thousandths.

This short historical review shows that the great difficulty of the men who first tried to write decimal fractions was to find a means of distinguishing, or *separating*, the fraction from the whole number. Some sign of separation was needed. These more or less clumsy ways of designating that separation have given way to the comma and decimal point. Indeed, the decimal point was used by one writer in 1612, but was abandoned. The comma is used to-day in many countries of Europe. The United States uses the point. (Mathematicians are interested at present in having the countries agree on one separatrix, America, of course, hoping that the point will be adopted.) With the simple separatrix, the writing of decimal fractions becomes an easy matter. The beginner in decimal fractions writes 1.1, one and 1-tenth; 1.11, one, 1-tenth, and 1-hundredth; 16.123, 16 and 1-tenth, 2-hundredths, and 3-thousandths. The decimal fractions should be read to him and by him for some time in this way. He is asked to write 4 and 7-tenths and 8-hundredths, and he writes 478 and reads it as above; then he is asked to write 4 and 8-hundredths, and, 78 units, each of which has the value 0.1, or, 7 units having the fill the tenths' value 1, plus 8 having the value place with zero, he writes 408, and reads 4 and 8-hundredths. Gradually, he reduces the fraction and reads 4 and 78-hundredths (see Fig. 1).

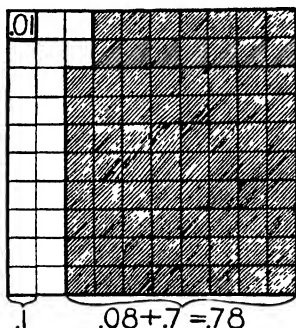


FIG. 1

The shaded portion represents 78 units, each of which has the value 0.1, or, 7 units having the fill the tenths' value 1, plus 8 having the value place with zero, he writes 408, and reads 4 and 8-hundredths. Gradually, he reduces the fraction and reads 4 and 78-hundredths (see Fig. 1).

The necessity of this reduction is evident; .78 is 7-tenths and 8-hundredths, which reduced to hundredths gives 78-hundredths. Approaching it from the other side, 78-hundredths, reduced, gives 7-tenths and 8-hundredths.

Which is hundredths' place?
The second place
Which is thousandths' place?
The third place.

These are the kind of questions that should come to the beginner in decimal fractions; not

"How many places for hundredths? for thousandths?" and so on.

After the reduction, the decimal fraction is read just as a common fraction; the number to the right of the decimal point is the numerator, and is read as a whole number, and the denominator is recognized from the last place occupied by the numerator; for example, .75 is read 75-hundredths, .094 is read 94-thousandths, 12.1854 is read 12 and 1854-ten-thousandths. These written as common fractions would appear:

$$\frac{75}{100}, \frac{94}{1000}, 12 \frac{1854}{10000}$$

Reduction of Decimal Fractions. If .6 is to be considered in hundredths, the hundredths' place is filled with a zero, and the fraction appears .60. If it is to be considered as thousandths, both hundredths' and thousandths' places are filled with zeros, and the fraction $700 = .70 = .7$.

$$\begin{array}{l} 600 \\ 6 = .60 = .600 \end{array}$$

Six - tenths = sixty - hundredths = 600 - thousandths.

Other illustrations:

$$\begin{array}{l} .75 = 750 \\ \frac{75}{100} = \frac{750}{1000} \end{array} \quad \begin{array}{l} .500 = .50 = .5 \\ \frac{500}{1000} = \frac{50}{100} = \frac{5}{10} \end{array}$$

From this we see that (1) zeros annexed to a decimal fraction do not change its value, as $.7 = 70 = .700$, and (2) zeros may be dropped from the end of a decimal fraction, and the value of the fraction remain the same, as, $.700 = 70 = .7$.

Addition and subtraction of decimal fractions hold nothing new for the child if he has appreciated the place value idea set forth above. He adds or subtracts just as in whole numbers; no time need be given to these. He sees that he needs the decimal point in the answer between units and tenths, just as in the addends or above the line. He knows that "the points must come under each other" so that tenths are all in the same "place," or column, hundredths all in the same place, etc. So, without preliminaries, he adds or subtracts as follows, just as in whole numbers:

$$\begin{array}{r} 7.8 \\ 10.48 \\ 12.096 \\ \hline 30.376 \end{array} \quad \begin{array}{r} 14.693 \\ - 8.452 \\ \hline 6.241 \end{array}$$

$$\begin{array}{r} 124 - 16.943 = n \\ 124.000 \\ - 16.943 \\ \hline 107.057 \end{array}$$

$$\begin{array}{r} 7.8 \quad 7.800 \\ 4.586 = 4.586 \\ 10.81 \quad 10.810 \\ \hline 32.196 \end{array}$$

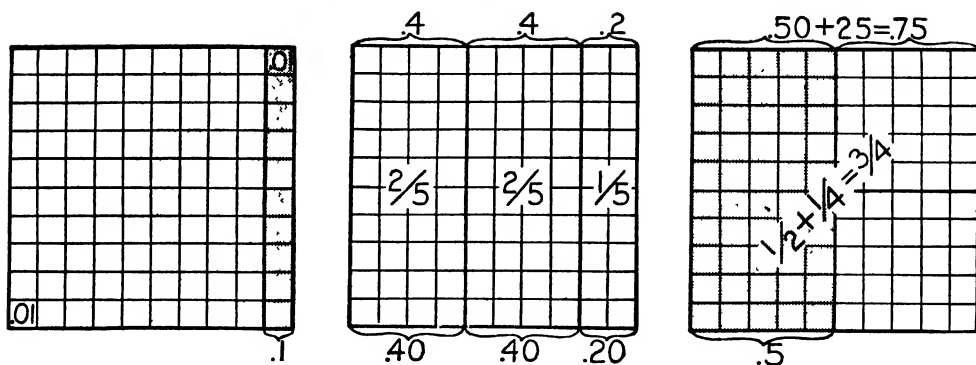


FIG. 2

The numbers to be added or subtracted may be reduced to the same denominator as in the last two problems above, by filling the places with zeros.

After the child has worked a day or two with the decimal fractions, he begins to wonder what to do when he has halves, fifths, and so forth. If one can work only with tenths, hundredths, and so on, he thinks the scheme of not much general value.

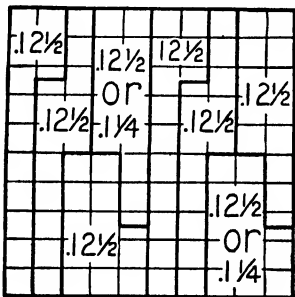


FIG. 3

Here is the time for introducing reduction of common fractions to decimals. He readily knows

$$\frac{1}{2} = .5; \frac{1}{5} = .2; \frac{4}{5} = .8; \frac{3}{4} = .75$$

and so on (see Fig. 2), but how can he reduce a fraction when he does not know what decimal is its equivalent? Let us investigate.

$1 = 1.0$. (Read, 1 equals ten-tenths, and write it as shown.) $1 = 1.0$.

$$\frac{1}{2} = \frac{1.0}{2} = .5. \text{ Read, } \frac{1}{2} \text{ equals } \frac{1}{2} \text{ of ten-tenths, or } .5$$

$$\frac{1}{5} = \frac{1.0}{5} = .2. \text{ Read, } \frac{1}{5} \text{ equals } \frac{1}{5} \text{ of ten-tenths, or } .2.$$

$$\frac{2}{5} = 2 \times \frac{1.0}{5} = \frac{2.0}{5} = .4. \text{ Read, } \frac{2}{5} \text{ equals } 2 \times \frac{1}{5} \text{ of ten-}$$

tenths, or $\frac{1}{5}$ of 20-tenths, or .4.

$$\frac{3}{5} = \frac{3.0}{5}. \text{ Read, } \frac{3}{5} = \frac{1}{5} \text{ of 30-tenths.}$$

He sees that to reduce a common fraction to

tenths, he changes the numerator to tenths and divides by the denominator:

$$\frac{1}{8} = \frac{1.0}{8} = .1\frac{1}{4}$$

(Fig. 3)

$$\frac{1}{8} = \frac{1.00}{8} = .12\frac{1}{2}$$

$$\frac{1}{8} = \frac{1.000}{8} = 125$$

Read $\frac{1}{8}$ equals $\frac{1}{8}$ of ten-tenths, or $.1\frac{1}{4}$. This is not a desirable form, because there is still a common fraction; he changes it to hundredths and finds still a common fraction; he tries thousandths, and finds the form rid of a common fraction, so he has $\frac{1}{8} = \frac{1.000}{8} = .125$, reading $\frac{1}{8} = \frac{1}{8}$ of 1000-thousandths, or 125-thousandths. Therefore,

$$\frac{3}{8} = 3 \times \frac{1.000}{8} = \frac{3.000}{8} = .375$$

(Fig. 4). Now he is ready to change any common fraction to a decimal fraction. He changes the numerator to tenths, hundredths, etc., and divides by the denominator. He sees that his answer must be the same decimal name as his numerator (or dividend).

Put into rule form, it becomes: To change a common fraction to a decimal fraction, change the numerator to tenths, hundredths, etc.; divide by the denominator, and point off as many places in the answer as there are in the numerator; for example:

$$\frac{7}{8} = \frac{7.000}{8} = .875$$

$$\frac{3}{16} = \frac{3.0000}{16} = .1875$$

$$\frac{9}{50} = \frac{9.00}{50} = .18$$

$$\frac{17}{80} = \frac{17.0000}{80} = .2125$$

$$\frac{2}{3} = \frac{2.0000}{3} = .6666 +$$

Here comes the common fraction that cannot reduce to a decimal fraction without having a fraction in the numerator of the decimal:

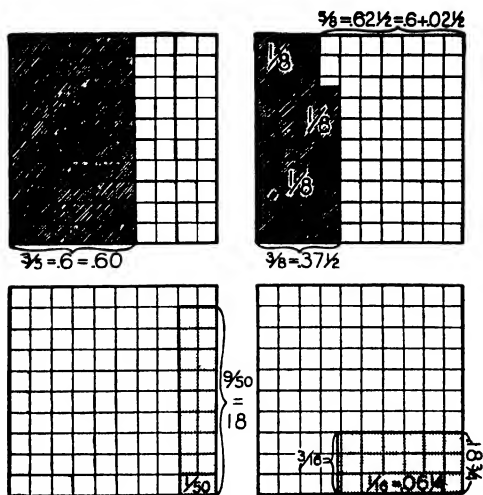


FIG. 4

$$\begin{aligned}\frac{1}{3} &= \frac{10}{3} = .3\frac{1}{3} \\ \frac{5}{6} &= \frac{500}{6} = .83\frac{1}{3} \\ \frac{5}{6} &= \frac{50000}{6} = .8333\frac{1}{3}\end{aligned}$$

There are two points of interest here:

- (1) In $.3\frac{1}{3}$, $\frac{1}{3}$ is $\frac{1}{3}$ of a tenth (Fig. 5)

In $.83\frac{1}{3}$, $\frac{1}{3}$ is $\frac{1}{3}$ of a hundredth

In $.8333\frac{1}{3}$, $\frac{1}{3}$ is $\frac{1}{3}$ of a ten-thousandth

(2) When shall one drop the fraction? This depends upon the real problem that gives rise to the fraction, and *only the conditions of that problem can determine when the fraction may be discarded*. This depends upon the value of the material and the degree of accuracy desired. Is it a fraction of a pound of coal or of a gram of radium? Is the answer required a rough estimate or a refined exactness? But for practice in abstract numbers, the class may carry to two places at one time, three places another time, and so on. These points determine when the fraction may be dropped.

Multiplication of Decimals. Moving the decimal point changes the place of the digits that express a number, and therefore changes the value of the number; for example, 67.3. Here 6 represents 60, 7 is 7 ones, 3 is 3-tenths. Move the point one place to the right, 67.3; 6 becomes 600, 7 becomes 70, and 3 becomes 3 ones, making the number 10 times what it was before. Move the point one place to the left from its position in the first example, and have 6.73; 6 becomes 6 ones, 7 becomes 7-tenths, and 3 becomes 3-hundredths, which makes the

number $\frac{1}{10}$ what it was at first. So we see that moving the decimal point one place to the right multiplies the number by 10, and moving it one place to the left divides the number by 10.

Multiply the following by moving the point one place to the right, and we have:

7.6	76.
4.16	41.6
17.09	170.9
6.004	60.04

Divide the following by 10 by moving the point one place to the left, and we have:

8.6	.86
12.07	1.207
.18	.018

It is easily seen from the above discussion that moving the point two places to the right multiplies, and two places to the left divides, the number by 100. This can be seen for any number of places when the effect of moving one place is clear.

Multiplier changes:

- (1) $424 \times 142 = 60208$
(2) $424 \times 14.2 = n$

How does the second multiplier compare with the first? It is $\frac{1}{10}$ as great; therefore the second product is $\frac{1}{10}$ as great as the first. We find a number $\frac{1}{10}$ as great as 60208 by moving the decimal point one place to the left. So (2) above becomes $424 \times 14.2 = 6020.8$.

- (3) $424 \times 1.42 = n$

How does the third multiplier compare with the second? It is $\frac{1}{10}$ as great; therefore the third product will be $\frac{1}{10}$ as great as the second product. This number we get by moving the point in the second product one place to the

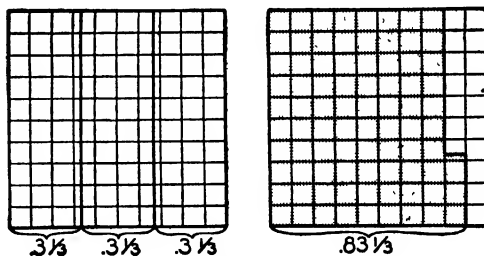


FIG. 5

left, and we have $424 \times 1.42 = 602.08$. Now let us look at the three together:

$$\begin{aligned}424 \times 142 &= 60208 \\ 424 \times 14.2 &= 6020.8 \\ 424 \times 1.42 &= 602.08\end{aligned}$$

We see that when the *multiplicands* are the same and the *multiplier* changes, the *product* changes in the same proportion as the multiplier.

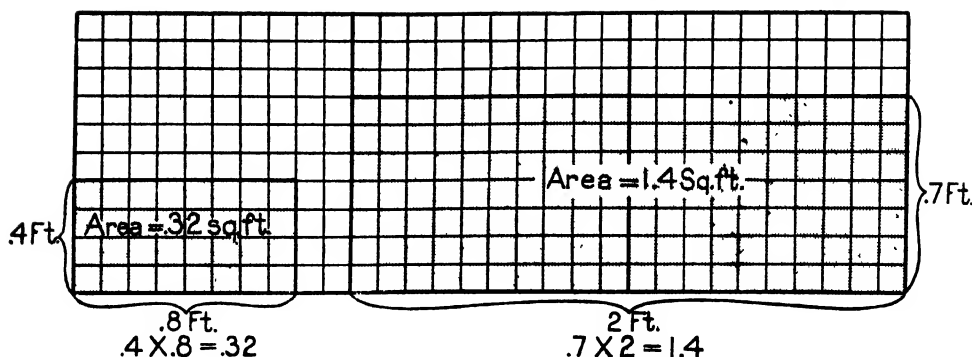


FIG 6

The same thing can be shown where the multipliers are the same and the multiplicand changes, as:

$$\begin{aligned} 424 \times 142 &= 60208 \\ 42.4 \times 1.42 &= 60.208 \\ 4.24 \times 1.42 &= 6.0208 \end{aligned}$$

The second product is $\frac{1}{10}$ of the first, and the third is $\frac{1}{10}$ of the second, because in each case the multiplicand is $\frac{1}{10}$ as great as the preceding one, and the multiplier is the same as the preceding multiplier. Here the product changes as the multiplicand changes.

Multiplicand and multiplier change:

$$\begin{aligned} 424 \times 142 &= 60208 \\ 424 \times 14.2 &= 6020.8 \\ 42.4 \times 14.2 &= 602.08 \\ 4.24 \times 14.2 &= 60.208 \\ 4.24 \times 1.42 &= 6.0208 \end{aligned}$$

From this it is seen that the product varies in value as the multiplicand and multiplier together vary, that for each division of either multiplicand or multiplier by 10, the product is divided by 10, put in the common language of arithmetic, "The product contains as many decimal places as the multiplicand and the multiplier together." (See Fig. 6.)

The formal rule is: *Multiply as in whole numbers; point off in the product as many decimal places as there are decimal places in the multiplicand and the multiplier.*

Division of Decimals. This follows directly from multiplication; with two points clear in mind, division of decimals presents no new difficulty. These points are:

(1) A dividend is the product of the divisor and quotient.

(2) A product contains as many decimal places as the multiplicand and multiplier together contain. That is, (1) $7 \times 8 = 56$, and (2) $7 \times n = 5.6$.

Number (2) above says, "What number multiplied by 7 gives the product 5.6?" From the work we have done in multiplication of decimals, we know that the missing number must have one decimal place, because the product has one; now the other term, 7, has none, and

therefore $n = .8$. In this statement (3), $7 \times n = .56$, the product has two decimal places, and the given number, 7, has none; so n must have two, and $n = .08$.

In (4), $.7 \times n = .056$, the product has three decimal places and the given number, .7, has one decimal place, therefore n must have two decimal places, and $n = .08$.

If (5) $n \times .08 = .0056$, $n = .07$. Why? Because the number of decimal places in n added to the number in .08 makes 4, the number in .0056, the product.

Express the same problems in division.

- (2) $56 \div 7 = n$ (n stands for the quotient)
- (3) $.56 \div 7 = n$
- (4) $0.56 \div 7 = n$
- (5) $0.056 \div .07 = n$

One sees how many decimal places there are in n each time by seeing what number of decimal places must be added to the number of decimal places in the divisor to make the number of decimal places in the dividend (or, in other words, he sees the *dividend* as a *product*). This attack upon division of decimals makes it a very simple piece of work. The dividend is a product; therefore, it contains as many decimal places as the two terms, namely, divisor and quotient, that produce it. Expressed as a rule:

Divide as in whole numbers, and point off as many decimal places in the quotient as added to the number of decimal places in the divisor will give the number of decimal places in the dividend

One special case must be considered under this that often gives much trouble, namely, where the dividend does not have so many decimal places as the divisor. Since the dividend is the product of divisor and quotient, it must have at least as many places as one of those terms. For example, put into multiplication form, $15 \div 75 = n$ becomes $15 = .75 \times n$. When .75 and n were used to give a product, that product had at least two decimal places; therefore, 15 in its present form could not have come from such multiplication; it must

DECLARATION OF INDEPENDENCE 1865 DECLARATION OF INDEPENDENCE

have been 15.00 or have had more decimal zeros. The division problem now is:

$$\begin{array}{r} 15.00 \div .75 = 20 \\ \text{Proof: } .75 \times 20 = 15.00 \end{array}$$

The proof shows clearly that 15.00, and not 15, was the form of the product; and that form must be restored, so that we may divide.

Let us look at it first from the view of multiplication, and then division:

$$\begin{array}{r} 144 \\ .25 \\ \hline 720 \\ 288 \\ \hline 3600 \end{array} \quad 36 \div .25 = 144$$

Restore the two zeros that we discarded, and we have $3600 \div 25 = 144$.

To sum up: When a product ends in decimal zeros, these zeros may be cut off, but when this product is brought to view again as a dividend, the discarded zeros must be restored before division is performed. In the language of arithmetic: *The dividend must have at least as many decimal places as the divisor before we begin to divide, and if it has not, we must add the required number of decimal zeros.* For example:

$$\begin{array}{l} 18 \div .006 = 18000 \div .006 = 3000 \\ 1.8 \div .006 = 1800 \div .006 = 300 \\ 18 \div .006 = .180 \div .006 = 30 \end{array}$$

$$\begin{array}{l} 225 \div .15 = 22500 \div .15 = 1500. \\ 7000 \div 14 = 70000 \div 14 = 5000 \end{array}$$

J.W.Y

DECIMAL SYSTEM. See METRIC SYSTEM.

*A Declaration by the Representatives of the UNITED STATES
OF AMERICA, in General Congress assembled*

*When in the course of human events it becomes necessary for one people to
dissolve the political bonds which have connected them with another, and to*

DECLARATION OF INDEPENDENCE. The Fourth of July is universally celebrated as a holiday in the United States to commemorate the greatest event in the history of the nation. On that day, in 1776, the Continental Congress adopted and proclaimed to the world the Declaration of Independence. This famous historic document set forth the fundamental principles of all good government and declared the independence of the thirteen colonies of Great Britain in America. The day of its adoption was indeed the birthday of a new nation.

When this Declaration was passed, actual warfare to drive out the forces of the mother country had already begun. The battles of Lexington and Concord and of Bunker Hill had been fought, Ticonderoga and Crown Point had been wrested from the British, Washington had been appointed commander in chief of the army, and the last futile petition had been sent to King George III. The spirit of independence was abroad.

Lee's Memorable Resolution. Early in 1776, several delegates to Congress, which was in session in Philadelphia, were instructed by the patriots whom they represented to vote for a formal statement of independence, and Massachusetts, New Hampshire, and South Caro-

lina had previously set up independent colonial governments. On May 15, Congress adopted a resolution advising all the other colonies to follow the example of the three, and the way was therefore paved for the famous resolution of Richard Henry Lee of Virginia, who moved, on June 7:

That these United Colonies are, and of right ought to be, free and independent States, that they are absolved from all allegiance to the British Crown,



WHERE THE DECLARATION WAS WRITTEN
House in Philadelphia in which Jefferson and his associates framed the document.

The illustration with the heading of this article is a facsimile of the first lines of the original Declaration, as written by Thomas Jefferson

and that all political connection between them and the State of Great Britain is, and ought to be, totally dissolved;

That it is expedient forthwith to take the most effectual measures for forming foreign alliances;

That a plan of confederation be prepared and transmitted to the respective colonies for their consideration and approbation.

These motions were at once seconded by John Adams of Massachusetts, and were debated on June 8 and 10, but action thereon was postponed until all the colonies could act.

The Committee on Declaration. On June 10 a committee was appointed "to prepare a Declaration to the effect of the first said resolution." On this committee were some of the most illustrious men of the period—Thomas Jefferson, its chairman, and his four able assistants, John Adams, Benjamin Franklin, Roger Sherman, and Robert R. Livingston. The committee made its report on June 28.

The Final Steps. On July 1 the consideration of Lee's resolution was renewed, Congress forming itself into a committee of the whole and sitting with closed doors while the great debate was in progress. John Adams delivered a speech in favor of the resolution which was so effective that Thomas Jefferson afterward

called him the "Colossus of that debate." The next day, Lee's motion was formally adopted; on July 3 the Declaration, which was drafted by Jefferson, was taken up, and on July 4 it was passed and published to the people. The delegates from twelve colonies gave their approval at this time, New York adding its vote on July 9.

The news of the adoption of the Declaration of Independence brought rejoicing to all parts of the country, and the famous Liberty Bell in Independence Hall was rung as never before, for Fourth of July of 1776 gave new meaning to the legend engraved upon it—"Proclaim liberty to all the land and to the inhabitants thereof" (see LIBERTY BELL). In the War of 1812, when the British raided Washington, the famous document was hidden in Leesburg, Virginia, where it remained until the capital was no longer in danger. The original document since 1921 is in the care of the Library of Congress, where it is yearly viewed by thousands of people. (See illustration, in article CONSTITUTION OF THE UNITED STATES.)

THE AMERICAN DECLARATION OF INDEPENDENCE

The unanimous declaration of the thirteen United States of America, in Congress, July 4, 1776

When, in the course of human events, it becomes necessary for one people to dissolve the political bands which have connected them with another, and to assume among the powers of the earth the separate and equal station to which the laws of nature and of nature's God entitle them, a decent respect to the opinions of mankind requires that they should declare the causes which impel them to the separation.

We hold these truths to be self-evident: That all men are created equal; that they are endowed by their Creator with certain inalienable rights; that among these are life, liberty, and the pursuit of happiness. That, to secure these rights, governments are instituted among men, deriving their just powers from the consent of the governed; that, whenever any form of government becomes destructive of these ends, it is the right of the people to alter or to abolish it, and to institute a new government, laying its foundation on such principles, and organizing its powers in such form as to them shall seem most likely to effect their safety and happiness. Prudence, indeed, will dictate that governments long established should not be changed for light and transient causes; and accordingly all experience hath shown that mankind are more disposed to suffer, while evils are sufferable, than to right themselves by abolishing the forms to which they are accustomed. But when a long train of abuses and usurpations, pursuing invariably the same object, evinces a design to reduce them under absolute despotism, it is their right, it is their duty, to throw off such government and to provide new guards for their future security. Such has been the patient suffering of these colonies, and such is now the necessity which constrains them to alter their former systems of government. The history of the present king of Great Britain is a history of repeated injuries and usurpations, all having in direct object

the establishment of an absolute tyranny over these states. To prove this, let facts be submitted to a candid world.

He has refused his assent to laws the most wholesome and necessary for the public good.

He has forbidden his governors to pass laws of immediate and pressing importance, unless suspended in their operation till his assent should be obtained, and, when so suspended, he has utterly neglected to attend to them.

He has refused to pass other laws for the accommodation of large districts of people, unless those people would relinquish the right of representation in the legislature—a right inestimable to them and formidable to tyrants only.

He has called together legislative bodies, at places unusual, uncomfortable, and distant from the repository of their public records, for the sole purpose of fatiguing them into compliance with his measures.

He has dissolved representative houses repeatedly for opposing with manly firmness his invasions on the rights of the people.

He has refused for a long time after such dissolutions to cause others to be elected; whereby the legislative powers, incapable of annihilation, have returned to the people at large for their exercise. the state remaining, in the meantime, exposed to all the dangers of invasion from without and convulsions within.

He has endeavored to prevent the population of these states; for that purpose obstructing the laws for naturalization of foreigners; refusing to pass others to encourage their migration hither, and raising the conditions of new appropriations of lands.

He has obstructed the administration of justice by refusing his assent to laws for establishing his judiciary powers.

He has made judges dependent on his will alone for the tenure of their offices and the amount and payment of their salaries.



SIGNING OF THE DECLARATION OF INDEPENDENCE

From the painting by Trumbull
1867

He has erected a multitude of new offices and sent hither swarms of officers to harass our people and eat out their substance.

He has kept among us, in times of peace, standing armies without the consent of our legislatures

He has affected to render the military independent of and superior to the civil power.

He has combined with others to subject us to a jurisdiction foreign to our constitutions and unacknowledged by our laws, giving his assent to their acts of pretended legislation:

For quartering large bodies of armed troops among us;

For protecting them by a mock trial from punishment for any murders which they should commit on the inhabitants of these states;

For cutting off our trade with all parts of the world;

For imposing taxes on us without our consent;

For depriving us in many cases of the benefits of trial by jury.

For transporting us beyond seas to be tried for pretended offenses,

For abolishing the free system of English laws in a neighboring province, establishing therein an arbitrary government, and enlarging its boundaries so as to render it at once an example and fit instrument for introducing the same absolute rule into these colonies,

For taking away our charters, abolishing our most valuable laws, and altering fundamentally the forms of our governments;

For suspending our own legislatures and declaring themselves invested with power to legislate for us in all cases whatsoever

He has abdicated government here by declaring us out of his protection and waging war against us

He has plundered our seas, ravaged our coasts, burnt our towns and destroyed the lives of our people

He is at this time transporting large armies of foreign mercenaries to complete the work of death, desolation, and tyranny already begun, with circumstances of cruelty and perfidy scarcely paralleled in the most barbarous ages and totally unworthy the head of a civilized nation.

He has constrained our fellow citizens taken captive upon the high seas to bear arms against their country, to become the executioners of their friends and brethren, or to fall themselves by their hands

He has excited domestic insurrection amongst us, and has endeavored to bring on the inhabitants of our frontiers the merciless Indian savages, whose known rule of warfare is an undistinguished destruction of all ages, sexes, and conditions

In every stage of these oppressions we have petitioned for redress, in the most humble terms, our repeated petitions have been answered only by repeated injury. A prince whose character is thus marked by every act which may define a tyrant is unfit to be the ruler of a free people.

Nor have we been wanting in attention to our British brethren. We have warned them, from time to time, of attempts by their legislature to extend an unwarrantable jurisdiction over us. We have reminded them of the circumstances of our emigration and settlement here. We have appealed to their native justice and magnanimity; and we have conjured them by the ties of our common kindred, to disavow these usurpations, which would inevitably interrupt our connections and correspondence. They, too, have been deaf to the voice of justice and con-

sanguinity. We must, therefore, acquiesce in the necessity which denounces our separation, and hold them, as we hold the rest of mankind, enemies in war; in peace, friends.

We, therefore, the representatives of the United States of America, in general congress assembled, appealing to the Supreme Judge of the World for the rectitude of our intentions, do, in the name and by the authority of the good people of these colonies, solemnly publish and declare that these united colonies are, and of right ought to be, free and independent states; that they are absolved from all allegiance to the British crown, and that all political connection between them and the state of Great Britain is, and ought to be, totally dissolved, and that as free and independent states they have full power to levy war, conclude peace, contract alliances, establish commerce, and to do all other acts and things which independent states may of right do. And for the support of this declaration, with a firm reliance on the protection of Divine Providence, we mutually pledge to each other our lives, our fortunes, and our sacred honor

Signed by order and in behalf of the Congress

JOHN HANCOCK, President.

Attested, CHARLES THOMSON, Secretary.

New Hampshire	Benjamin Franklin.
Josiah Bartlett	John Morton
William Whipple	George Clymer.
Matthew Thornton	James Smith.
Massachusetts Bay:	George Taylor.
Samuel Adams.	James Wilson.
John Adams	George Ross.
Robert Treat Paine.	Maryland:
Elbridge Gerry	Samuel Chase.
Rhode Island, Etc	William Paca.
Stephen Hopkins.	Thomas Stone.
William Ellery.	Charles Carroll of
Connecticut	Carrollton.
Roger Sherman.	Virginia
Samuel Huntington.	George Wythe.
William Williams.	Richard Henry Lee.
Oliver Wolcott	Thomas Jefferson.
New York:	Benjamin Harrison.
William Floyd	Thomas Nelson, Jr
Philip Livingston.	Francis Lightfoot Lee
Francis Lewis	Carter Braxton
Lewis Morris	North Carolina:
New Jersey	William Hooper.
Richard Stockton	Joseph Hewes.
John Witherspoon	John Penn.
Francis Hopkinson	South Carolina:
John Hart	Edward Rutledge
Abraham Clark	Thomas Heyward, Jr.
Delaware	Thomas Lynch, Jr
Caesar Rodney	Arthur Middleton
George Read	Georgia
Thomas McKean.	Button Gwinnett
Pennsylvania	Lyman Hall
Robert Morris	George Walton
Benjamin Rush	

DECLARATION OF RIGHTS. See BILL OF RIGHTS.

DECLARATORY ACT. See UNITED STATES (History: Causes of the Revolution).

DECLENSION, de klen' shun. When the different forms of any noun or pronoun are arranged in their order in the three cases and

both numbers, we are said to *decline* it, or to give its *declension*. Thus, declension is to nouns and pronouns what conjugation is to

requires her pupils to learn rules in arithmetic and then use these rules in the solution of the problems assigned in their daily lessons,

	SINGULAR	PLURAL	SINGULAR	PLURAL	SINGULAR AND PLURAL
<i>Nom.</i>	man	men	he	they	who
<i>Poss.</i>	man's	men's	his	their	whose
<i>Obj.</i>	man	men	him	them	whom

verbs and comparison to adjectives; that is to say, it is a form of inflection, or the systematic arrangement of changes in form. The noun *man*, the personal pronoun *he*, and the relative pronoun *who* are declined above as types.

Among the interrogative and relative pronouns, *who* (with its compounds *whoever* and *whosoever*) is the only one that is declined, for *which*, *what*, and *that* have the same form in both the nominative and objective cases, singular and plural. *What* and *that* are not used in the possessive case, but the phrase *of which* is used when a possessive form of *which* is needed. Sometimes *whose*, the possessive case of *who*, is used instead of the phrase *of which*; this is commonly done to make a sentence less bulky, as in the sentence, "The shrub whose leaves are falling is being transplanted," used for, "The shrub, the leaves of which are falling, is being transplanted."

See INFLECTION

DECLINATION. See RIGHT ASCENSION AND DECLINATION OF STARS.

DECOMPOSITION, *de kom po zish' un*, in chemistry, is the separation of a compound substance into simpler compounds, or into the elements of which it is composed. Thus, water may be decomposed into hydrogen and oxygen, and limestone into lime and carbon dioxide. A distinction is sometimes made between decomposition due to natural causes, and separation effected by the application of chemical agents. For example, animal and vegetable matter, when attacked by certain micro-organisms, decomposes, or decays. In the laboratory, the chemist separates mercuric oxide into mercury and oxide by the application of heat. Such decomposition is usually termed *analysis*. See ANALYSIS. T.B.J.

Related Subjects. The reader will find a full discussion of the decomposition of plant and animal tissues in the article PUTREFACTION and related articles there indexed. See, also, GEOLOGY (Work of the Atmosphere)

DECORATION DAY. See MEMORIAL DAY.

DECOY. See DUCK, subhead.

DECRESCENDO, *da kreh shen' do*. See MUSIC (A Course of Lessons).

DEDHAM, *ded' am*, MASS. See MASSACHUSETTS (back of map).

DEDUCTIVE, *de duk' tiv*, **METHOD**, a method of teaching in which definitions, principles, and rules are stated, and then applied to the solution of a problem or in the classification of facts under consideration. The teacher who

is teaching by the deductive method. The teacher who requires her pupils to learn definitions in geography and then apply these definitions to the forms of land and water, is also using the deductive method.

The deductive method is often called the method of authority, since it requires the pupil to accept the knowledge gained by another. It is also the method of applying knowledge. When the pupil is old enough to reason, and has arrived at that maturity of judgment which will enable him to determine what rules, definitions, or principles to apply to the problem in hand, the deductive method has many advantages. It enables the pupil to apply the knowledge he has already acquired and in this way to fix it firmly in mind; it also saves time. The use of the deductive method increases as the pupils advance in the grades, and most of the textbooks designed for grammar grades are based upon the deductive plan, especially those in mathematics, geography, and history.

The four successive steps necessary to the success of the deductive method follow:

- 1 A clear understanding of the problem to be solved
- 2 Examination of the principles, definitions, and rules, or the knowledge possessed by the pupil.
- 3 Application of the related knowledge to the problem
- 4 Testing this application, to determine whether or not the correct solution has been reached. See INDUCTIVE METHOD C.E.S.

DEE, RIVER. See SCOTLAND (Rivers and Lakes).

DEED, in law, a written contract or agreement, and the evidence of its execution. When the term is used without special qualification, it means a written contract for conveying real estate—land and buildings—either by sale or gift. Deeds are of two sorts, *quitclaim* and *warranty*. The quitclaim deed conveys to the purchaser the rights held by the party who sells, and no others; in other words, the seller disposes of his rights in the property, but does not guarantee the purchaser against claims of others. Should the seller's title be faulty, the purchaser under a quitclaim deed cannot recover damages from the seller, unless he can prove fraud on the part of the latter.

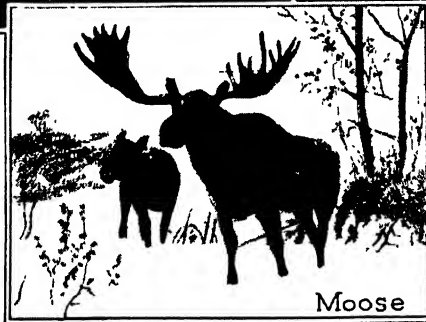
In a warranty deed, the party who sells the property agrees to defend the title against all claims that may be brought against it; in other words, the seller guarantees, or warrants, that



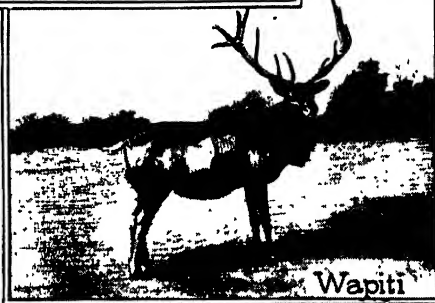
Mule Deer

Axis
Hind

Fallow Deer



Moose



Wapiti

Female
Siberian
Roe

Reindeer

DEEP-SEA DIVING. See **DIVING.**

DEEP-SEA FISHERIES. See **FISH**, subtitle.

DEER. Among all hoofed mammals, the deer are distinguished for grace of body, swiftness of flight, and, in case of the males, the possession of solid branching horns, or antlers. The fifty to sixty living species are found the world over, except in Australasia and South Africa. In a broad sense, the deer family includes not only such typical and well-known forms as the *red deer*, or *stag*, of Europe, and the *American elk*, or *wapiti*, but the great flat-horned *moose* of North America, the *caribou*, and the *reindeer*.

[At the close of this article will be found a list of the members of the deer family described in these volumes under their proper titles.]

Kinds and Characteristics of Deer.

The red deer of Europe may be taken as the type of the standard round-horned, or true, deer. The male over five years old is known as a *stag*; an old stag is a *hart*; the female is a *hind*; and the young are *fawns*. This deer, called by Scott "the antlered monarch of the waste," stands about four feet high at the shoulder, and is nearly seven feet in length. It has a bright reddish-brown coat in summer, and a thicker coat in winter, with grayish tinge. The fawns are born with white spots.

the property he transfers is handed over with a perfect title. Should the title unexpectedly prove defective, the purchaser may recover the money paid, with interest, provided the one who sold the property has sufficient means to pay the claim; otherwise, the purchaser must himself stand the loss.

A deed must always be in writing, and must be signed by both parties to the contract, and sealed. Two witnesses are usually required, and the deed should be acknowledged before a notary public or some other official authorized to administer oaths. *Acknowledgment* consists in the seller's declaration under oath that it is his own full act.

When the purchaser receives the deed he should have it *recorded* in the proper office; in most instances, this is the office of the registrar of deeds for the county in which the property is located. Every deed should be accompanied by an *abstract of title*, which is a record of all transfers of the property from the original owner (the state) to the present purchaser. The validity of the title depends upon the completeness and correctness of this abstract.

Torrens System. A simplified method of transfer, called the Torrens system, is described in this work under that title.



IN GLACIER NATIONAL PARK

Photo U & U

The young son of a forest ranger is offering a caress to a fawn, the latter seems almost, if not quite, persuaded that no harm can come from its little friend.



A FRIENDLY VIRGINIA DEER

Photo: P & A

It overcame its natural shyness and accepted something to eat from the hands of the young miss. The picture was taken in the New York Zoological Gardens.

The antlers, those prized trophies of the chase, are shed and renewed annually, as is the custom with all deer. Antlers are acquired gradually, as age increases, each successive breeding season being celebrated usually with an additional prong on each, until the pattern is complete. They are outgrowths of the frontal bones and are developed on rough disks, or roots, the *pedicles*. During growth, the antlers are covered with a soft, hairy skin, the so-called

velvet, which is supplied with blood vessels and is very tender. At the end of the growing period, the velvet dries up and peels off, or is removed as the animal rubs against trees. Antlers are shed at a time when the females are rearing the young. The renewal process absorbs much of the deer's energy, and is supposed to be associated with Nature's method of keeping the stags quiet and peaceable at a critical period in the life of the mothers and offspring. Hinds usually bear one fawn early in the summer, although there are occasionally two or three. The fawns stay with the mother two or three years, after which they wander off to mate, although it is said

they are not full-grown for fourteen or fifteen years. These deer live on leaves, herbs, and lily pads in summer and on lichens, moss, and bark in winter. The stags are said to eat only fungi in breeding time. A smaller European species, of pale-yellow color, is the *fallow deer* common in England.

The *Virginia*, or *white-tailed*, deer is the common deer of the forests of Eastern North America, from Florida to Northern Ontario. It is also found in the western mountains of the continent. The adults are brownish-gray in winter and reddish in summer. The upper surface of the tail is black; the under surface, which is white, is exposed when the tail is raised in flight from danger. These deer are

shy and elusive in the wild state, but in game preserves and when protected they lose some of their fear. Closely related species of smaller size are the *Arizona* and the *Florida white-tailed deer*. Of very restricted range is the *black-tailed deer*, found in the humid forest belt from the California Coast Range as far north as Juneau, Alaska. The black-tails produce two or three young yearly, and are protected by the dense forests in which they live.

These conditions have tended to offset their rapid decrease, due to the hunter's gun and the attacks of wolves.

Protection of Deer. Hunting deer has been a favorite sport in America, as in Europe, from frontier times, and it became necessary, eventually, to make laws to prevent the extinction of this species. If such laws were not made and enforced, soon *venison*, the meat of the deer, and leggings and gloves of *buckskin*, made from their hides, would be but things of the past, to be read about only in Indian tales, and in such books as Cooper's *Leatherstocking Tales*; and the beautiful animal itself would peer at us only



A DEER FAMILY

From painting by Landseer

through the netting of some park fence, or perhaps only from the canvas of a Landseer. See **GAME** (Game Laws).

W.N.H.

Scientific Names. Deer belong to the family *Cervidae*. The red deer of Europe is *Cervus elaphus*, the fallow deer, *C. dama*, the Virginia deer is *Odocoileus virginianus*, the black-tailed, *O. columbianus*.

Related Subjects. The reader is referred in these volumes to the following articles.

Caribou
Elk
Moose
Mule Deer

Musk Deer
Reindeer
Roebuck
Stag

DEER MOUSE, a name commonly applied to certain North American rodents with deer-like coloring. The common deer mouse, or *white-footed mouse*, common in woodlands and

often seen about country houses, may be recognized by its pure-white under parts and feet, and its fawn-colored upper parts. Including the tail, it is about seven inches long. It usually builds its nest under logs or woodpiles, very much like other mice, but it has been known to reclaim the abandoned nests of song birds. This deer mouse is nocturnal in its habits and feeds on nuts, berries, and grain.

Another well-known deer mouse is the *jumping mouse*, so called from its habit of leaping as it runs. It is a strong, active creature, with long hind legs, and very short forelegs, which it uses as paws, like a squirrel. Its hind legs and tail give it extraordinary jumping powers, a leap of ten feet being easily accomplished. It has a pouch in each cheek in which it carries grain and seeds. Jumping mice sleep soundly through the winter in a snug nest of grass and bark, hidden in a crevice in the rocks or in a hole in the ground. They are related to the jerboas of the Old World (see JERBOA). W.N.H.

Scientific Names. The white-footed mouse belongs to the family *Crucetidae*; its scientific name is *Peromyscus leucopus*. The jumping mouse belongs to the family *Zapodidae*, and is *Zapus hudsonius*.

DEFENDANT. See COURTS (Court Procedure).

DEFERRED PAYMENTS, PURCHASE ON. See CREDIT, sub-head.

DEFICIENCY DISEASES. See EPIDEMIC.

DEFOE, OR DE FOE, de fo', DANIEL (1660-1731), an author of imperishable fame, beloved by boys and girls because he wrote *Robinson Crusoe* (which see). This was one of the first examples of English prose fiction, and it still ranks among the greatest adventure stories in

all literature. Defoe was the son of a butcher and was educated for the ministry, which, however, he abandoned, because it was not to

his liking. Entering into business, he became a hosier and for a time prospered, but eventually he failed and was declared bankrupt. Friends helped him to make a fresh start, and his second venture proved profitable. He early turned his attention to politics and writing; his first publications were satires that brought him into trouble with the government and eventually led to his imprisonment. He strongly sup-

ported William of Orange, and his poem *The True Born Englishman*, defending the king, brought him prompt recognition.

Estimate of His Work. In 1719 *Robinson Crusoe* was published. *The Memoirs of a Cavalier*, *Captain Singleton*, *Roxana*, and *Journal of the Plague Year* followed, and established his reputation as among the greatest writers of his time. Defoe possessed in a remarkable degree the power of presenting fiction as though it were fact. His descriptions of impossible situations are so natural that they appear not only possible but probable. He was a very prolific writer, issuing pamphlets on such varying subjects as religion, politics, commerce, banking, and the education of women. His views on these subjects were decidedly modern, and it might be said of him that he was "born before his time." See ROBINSON CRUSOE.

DE FOREST, LEE (1873-), an American inventor, a pioneer in radio broadcasting, and inventor of radio devices, among them the audion. See RADIO COMMUNICATION.

DEGENERATION, de jen ur a' shun, means, literally, a state of growing worse.

Degenerative Diseases of Man. These are caused by changes in tissues and organs of such a character that the affected parts cannot perform normal functions. Degeneration may be caused by old age, by lack of sufficient nourishment, by inactivity, by poisons, and by infectious diseases. The liver and kidneys, among the organs, and the mucous membrane, among the tissues, are the most liable to degeneration. Fatty degeneration consists in the accumulation of fat in or around the heart, arteries, liver, and other organs. Albuminous degeneration, or cloudy swelling, consists in

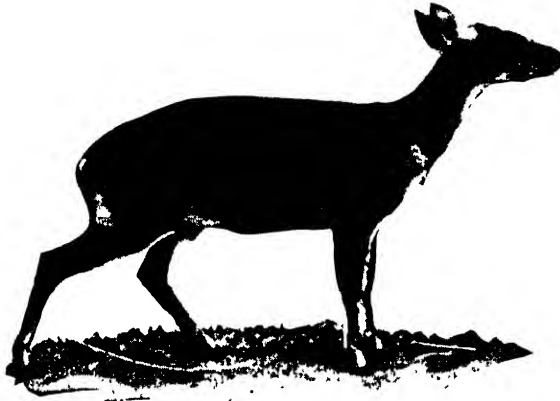


Photo P & A

RARE BARKING DEER

A specimen of the muntjac of the Asiatic deer family, rapidly approaching extinction. Two of these animals are in the San Diego (Calif.) zoo. This so-called barking deer is distinguished by its peculiar call, a hoarse, resonant bark.



Photo Brown Bros.

DANIEL DEFOE

fine granulation of cells in certain organs, particularly the kidneys and brain. The common ailment called hardening of the arteries, which is often associated with apoplexy, is a form of calcareous degeneration, in which the tissues are made hard by deposits of lime.

Appendicitis is a disease centered in an organ that has degenerated in man through lack of use—the vermiform appendix.

In Plants and Animals. Degeneration in plants and animals is due to several causes, chief among which are lack of nourishment, unsuitable location, and breeding for special purposes. Degeneration resulting from the first two causes may be noticed in plants growing year after year in a poor soil or in an unsuitable climate, or both. The plants will be smaller than those from which the seed was taken. If the seed from these smaller plants is planted season after season, an inferior plant, from which no better stock can be obtained, is the final result. This type of deterioration is equally true of animals. The wild horses formerly found in large numbers on the Great Plains in North America, and still found in South America, are far inferior to the original stock.

Degeneration as an effect of breeding may have desirable results. To illustrate, the development of the double rose was accomplished at the expense of the power of the rose to reproduce itself from its seed. The development of the dairy cow is at the expense of the animal's beef-producing qualities, and the development of the draft horse is at the expense of speed. Degeneration of this sort is not injurious as a whole. The breeder secures the perfection of certain qualities for a given purpose, for which he is willing to sacrifice the other qualities. He thus secures specialization in some characteristics, and degeneration in other characteristics.

Mental and Moral Degeneration. Careful study of crime and delinquency shows beyond question a close relation between physical and intellectual and moral degeneration. By far the larger number of boys and girls brought before juvenile courts are in some respects physically, as well as mentally, defective. The offspring of defectives are also likely to be defective; hence degeneracy tends to produce degeneracy. There are, of course, exceptions to this rule, since now and then a member of a family in excellent standing is a degenerate. Again, degeneracy may be the result of bad habits which have been followed so long that the victim is unable to regain his former mental and moral state. Chronic alcoholism is an important cause of physical, mental, and moral degeneration.

Mental and moral degeneration may apply to a community, as well as to an individual. Under slavery, entire peoples, as, for example,

some of the tribes of Central Africa, have been reduced to a condition little above that of the lower animals. In these cases, the degeneration is not entirely confined to the enslaved people; the master is said to be affected, as well as the servant. "He who is served is limited in his independence," and no one sustains the relation of master to these almost savage African slaves without himself being adversely affected.

R.H.

Related Subjects. Supplementary information may be found in these volumes under the following headings:

Apoplexy	Criminology
Appendicitis	Disease
Arteries	Kidneys
Atrophy	Liver

DEGREE, IN MATHEMATICS. Because the circumference of every circle is $3.14159+$ times its diameter, it is necessary in any case to know only one of these dimensions in order to learn the other (see **CIRCLE**). Therefore, to compute the length of an arc of a circle of known diameter, we need only be told how large a part the arc is of the whole circumference. This is one reason why it has been found convenient to say that the circumference of a circle is made up of 360 equal parts called *degrees*, and to subdivide each degree into 60 *minutes*, and each minute into 60 *seconds*. This defines what is meant by a degree, or minute, or second of *arc*. There are many other advantages of this division of a circle. Because of it, angles may be measured. A degree of *angle* is the angle subtended at the center of the circle by a degree of arc. This measurement makes possible the science of trigonometry, without which engineers could not survey or mariners steer with accuracy. It also gives a means of describing the exact location of points on the earth's surface, both latitude and longitude being given in degrees, minutes, and seconds.

Measurements in degrees are indicated by symbols, as in $40^{\circ} 42' 16''$, which means 40 degrees, 42 minutes, 16 seconds.

[More about the degree will be found in the articles **ANGLE**, **CIRCLE**; **LATITUDE**, **LONGITUDE**, **MERIDIAN**]

In Education. One who has completed a course of instruction in an institution of learning is usually granted a title called a degree. In general, these academic degrees indicate how long and what their holders have studied, but the significance of each title varies widely between countries and between schools in the same country. Some degrees, like Doctor of Laws, are often given by universities in honor of success in other lines than learning. The most common degrees will be found listed in these volumes under the heading **ABBREVIATIONS**.

J.W.V.

DE GROOT, de grote', HUGO. See **GROTIUS, HUGO**.

DEHYDRATION, *de hi dra' shun*, the process of preserving foods by drying. The word means *removal of water*. Such dried fruits as prunes, apricots, and raisins are marketed in huge quantities, and are as commonly used as fresh fruits. Dried meat, such as dried beef, powdered milk, dehydrated vegetables, and even dried eggs, are other products of dehydration. This process makes it possible for many families to have fruits, vegetables, and other foods that they might be unable to procure if they had to depend upon the fresh forms. Convenience and economy are the obvious advantages of using dehydrated foods. At times, these foods are indispensable, but no household should ever use them to the exclusion of fresh foods, especially fruits and vegetables, because the latter are valuable sources of vitamins (which see). The groups that owe the most to dehydration are travelers, explorers in remote regions, and men in armies and navies.

Drying fruits and vegetables in the sun or in a slow oven, and on racks above a stove, are methods still used by some housewives in rural districts. In commercial practice, sun drying, dehydration by artificial heat from burning fuel, and evaporation by means of air blast, natural ventilation, and the vacuum process are all employed. In Southern California, during the dry season, immense quantities of prunes, peaches, raisins, and apricots are dried by sun heat, but artificial drying and evaporation processes are more common in the Pacific Northwest.

Dried milk is prepared in large volume for the use of bakers, candy manufacturers, and ice-cream makers. It has practically the same value as pasteurized milk, and in times of milk scarcity is recommended for household consumption. E.V.M'C.

DEKALB, ILL. See ILLINOIS (back of map).

DE KALB, JOHANN, Baron (1721-1780), a German-American soldier who won distinction in the Revolutionary War. He was born at Hütten-dorf, in Bavaria. His name was simply JOHANN KALB, the "Baron" being self-styled. In 1743 he entered the French army, and became brigadier general in 1761. In 1777 De Kalb came to America with Lafayette, and during the same year was appointed a major general by Congress. He served with credit in the armies of Washington in Pennsyl-

vania and New Jersey, was second in command under General Gates in the Carolinas, and led the American forces at Camden. In the latter engagement, he was wounded eleven times, which resulted in his death a few days later. In 1825 Lafayette laid the corner stone of a monument to De Kalb at Camden.

DE KOVEN, REGINALD (1861-1920), an American composer, whose melodious and picturesque opera, *Robin Hood*, produced in 1890, was the first work by an American composer to take rank among standard light operas. He also composed numerous attractive songs, his *O Promise Me* being a universal favorite. De Koven was born in Middletown, Conn., and was graduated at Saint John's College, Oxford University, England. He studied music in Stuttgart, Florence, Paris, and Vienna. His successful opera, *The Begum*, produced in 1887, was the first of a notable list that includes, besides *Robin Hood*, *The Algerian*, *Rob Roy*, *The Mandarin*, *Red Feather*, and many others, all of which are characterized by refinement of melody, richness of harmony, and skill in construction. *Margery Daw*, *A Winter Lullaby*, *Indian Love Song*, and *Ask What Thou Will* are among his best songs. De Koven acted as music critic for several New York publications, and was the founder of the Washington Symphony Orchestra. His opera *Rip Van Winkle* was produced two weeks before he died. See ROBIN HOOD.

DELAGOA, *del a go' ah*, BAY, an inlet of the Indian Ocean indenting the coast of Mozambique (Portuguese East Africa). The southern portion is protected from the rolling waters of the ocean by the Inyack peninsula and island. At the head of the bay stands Lourenço Marques, an important port with excellent harborage. The bay has been well dredged, and vessels of the largest size can lie alongside the docks. Since the opening of a railway in 1895 from Lourenço Marques to Pretoria, capital of the Transvaal, the commercial importance of Delagoa Bay has greatly increased. Gold and other products from the Transvaal now find a ready outlet to the sea, and the longer freightage to Durban or Cape Town is avoided.

Since the South African War, the progress of British South Africa generally has been so rapid that the Portuguese authorities, who control the shipping to and from Delagoa Bay, have been compelled to take steps to extend



Photo. Brown Bros.

REGINALD DE KOVEN



Photo. Brown Bros.

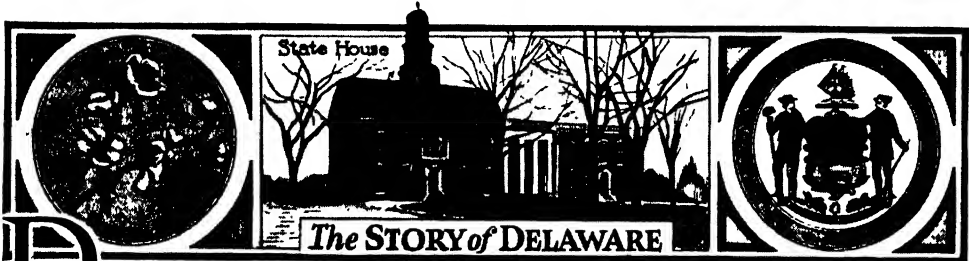
BARON DE KALB

railways to meet the demands of traffic. The result has been beneficial to the Transvaal, and especially so to Lourenço Marques. See MOZAMBIQUE.

DELAND, MARGARET (1857-), an American novelist whose stories for a generation have found an ever-increasing number of readers. She was born Margaret Campbell in Allegheny, Pa., educated at private schools, and in 1880 was married to Lorin F. Deland of Boston, in which city she thereafter made her home. Her writing abounds in discussions

of religious and social customs, which have evoked much comment.

Her Books. With the publication of *John Ward—Preacher* she came into universal notice; the volume was widely discussed. There followed *Sidney*, possibly showing the highest development of her technique; *The Awakening of Helena Richie*, one of the "best sellers"; *Philip and His Wife*, *The Iron Woman*, *Dr. Lavender's People*, *Florida Days*, *The Wisdom of Fools*, *An Encore*, *The Voice*, *The Common Way*, *Partners*, *The Hands of Esau*, *The Rising Tide*, *The Vehement Flame*, and *The Kays*.



DELAWARE. On the way to the West Indies, the ships of Lord de la Warr, first governor of Virginia, were blown from their course into a bay which they called Delaware. From this chance visit in 1611, bay, river, and state take their name. No settlement, however, was made, and it was twenty years later that the Dutch and Swedes began their struggle for this small corner of land and its rich fur trade. To-day, as the railroads pour out of Wilmington their unending carloads of manufactured products for the needs of a great nation, there is little in the busy city to recall the forests and the days when the Indians came down the Christina and Brandywine rivers to trade canoe-loads of furs for the white man's gaudy beads and blankets.

Size and Location. Delaware belongs to the group of Middle Atlantic states. With an area of 2,370 square miles, it is the second smallest state in the Union. Texas would make 112 states the size of Delaware. Its northern semi-circular boundary divides Delaware from Pennsylvania. This strange boundary was drawn on a twelve-mile radius from the courthouse of the city of New Castle. On the east are the Delaware River, Delaware Bay, and the Atlantic Ocean. The straight southern and western boundaries separate Delaware from Maryland.

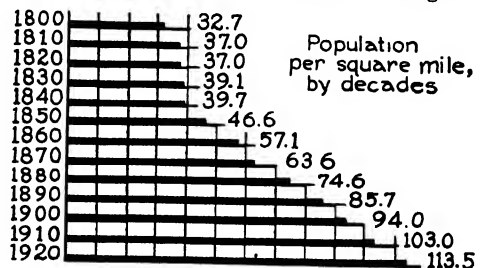
The People and the Principal Cities. Within Delaware's small land area live 223,003 people, according to the census of 1920, an average of 113.5 to the square mile. About fourteen per cent of the population is colored. Of the white population, about ten per cent is foreign-born, chiefly of Polish, Italian, Irish,

Russian, Austrian, German, and English parentage.

The state capital is Dover, but the largest city is Wilmington; the latter is the only town with a population exceeding 5,000.

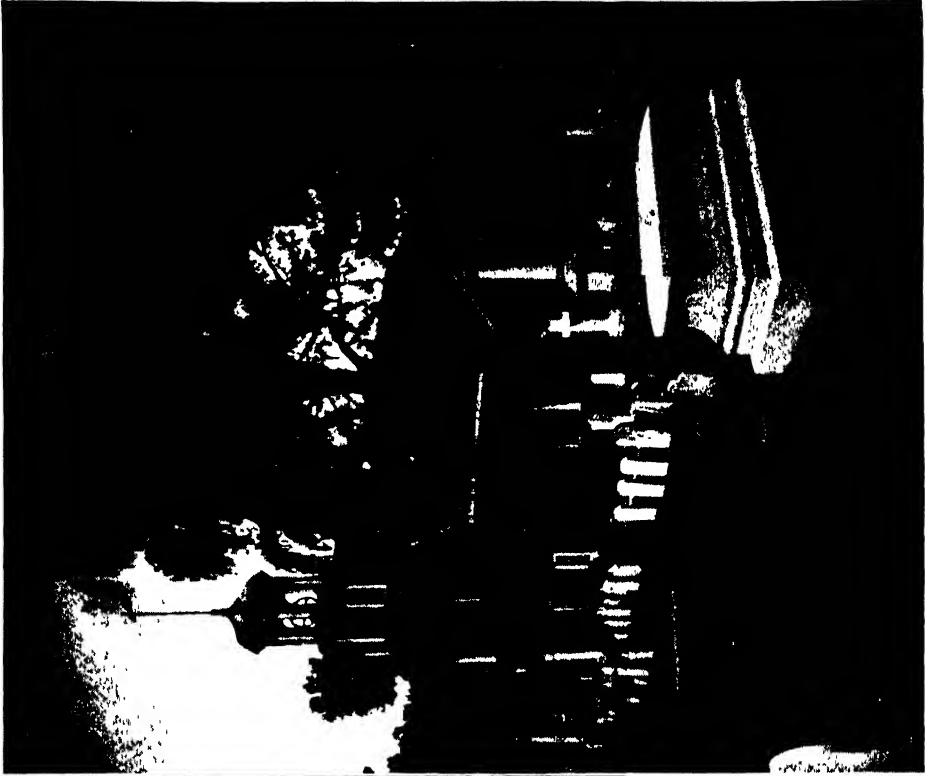
Education. In 1921 an almost centralized system of schools was organized, which abolished the county boards and put the power into the hands of a state board of education. Funds for the schools are provided by state taxes, to be expended by legislative budget. School attendance is compulsory. Separate schools are provided for white and colored pupils. The University of Delaware prepares white teachers for both elementary and high-school work, and the State College for Colored Students prepares elementary teachers for the colored schools.

At Dover is the State College for Colored Students. The University of Delaware, at Newark, was founded as Newark College in



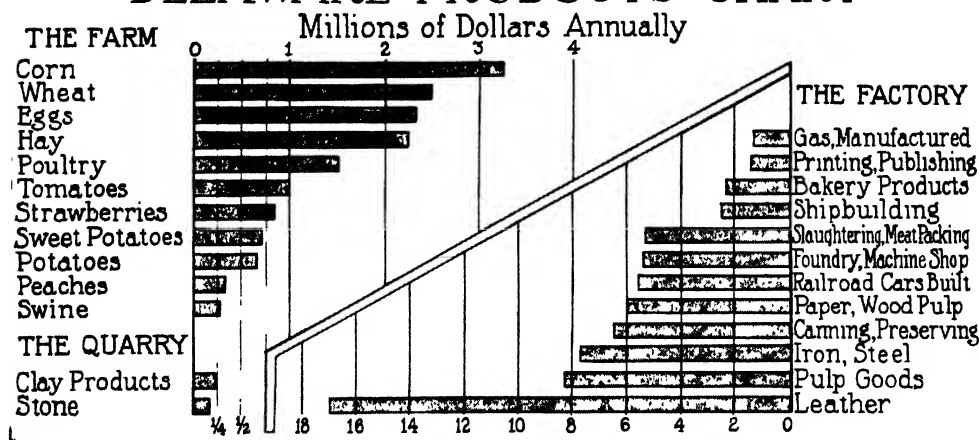
INCREASE IN POPULATION

1833. In 1913 it became state property, and a year later a Women's College was established having the same trustees and many of the same instructors, but with separate buildings.



Old Swedes' Church at Wilmington. The building dates back to the colonial period. In the interior view, the pulpit and door shown are the ones originally built into the structure. 1877

DELAWARE PRODUCTS CHART



FIGURES PRESENT AVERAGES FOR THREE YEARS

In 1921 an act of the legislature changed the name from Delaware College and the Women's College to the University of Delaware. The State College of Agriculture is a division of the university, and the work of the State Agricultural Experiment Station is done at the university.

Institutions. The state maintains a home for the feeble-minded at Stockley, an industrial school for colored girls at Marshallton and for white girls at Claymont, a state hospital at Farnhurst, a home for aged colored people at Wilmington, an old-folks' home at Dover, the Edgewood Sanitarium, and the Ferris Industrial School near Ellsmere.

The Land and Rivers. The northern portion of Delaware is a beautiful, fertile region of hills and dales. The land surface is uniformly low, level, and generally sandy in the extreme south, where there is also an area of swamp land.

Through the state from north to south runs a long, low divide, separating the numerous small streams, which flow east to Delaware Bay and west to Chesapeake Bay. Most of Delaware's streams are not navigable for large boats. Vessels go up the Christiana River past Wilmington, as far as Newport. The Marine Terminal on this river provides shipping facilities for the largest seagoing ships. The mouth of the Brandywine River serves as a basin for pleasure craft. Smyrna River, Leipsic River, Saint Jones River, Little Creek, Murderkill Creek, Mispillion River, and Broadkill Creek, all flowing into the Delaware Bay, serve as outlets for the shipping of fruit, vegetables, and grain, and are important in the fishing and oyster industries. Rehoboth Bay, reached by canal from Delaware Bay, and Indian River are broad, shallow, landlocked bodies of water abounding in fish and crabs,

in the southeast section of the state, whose shores are dotted in many places with summer cottages. The Nanticoke River, flowing into Chesapeake Bay, gives a navigable outlet to lower Delaware from the west.

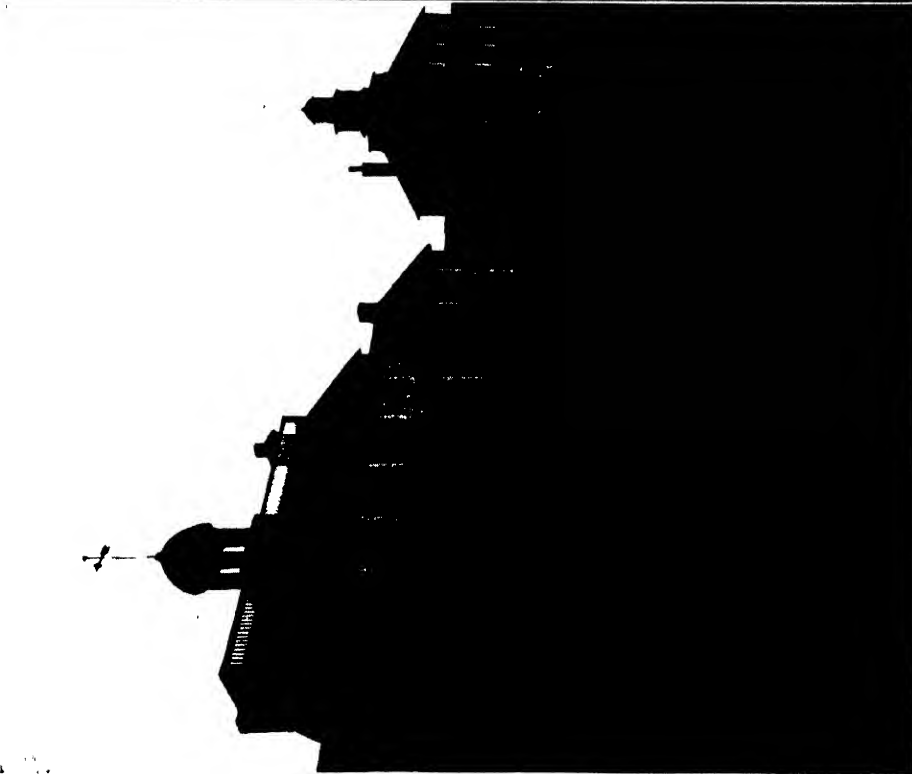
The marshy shores along Delaware Bay offer few good harbors, the best ones being at Lewes, near the south, and at New Castle and Wilmington at the north. The Delaware and Chesapeake Canal, thirteen and one-half miles long, from Delaware City to Chesapeake City, Md., is now a sea-level government canal, and has been deepened to accommodate ocean-going vessels.

Climate. The climate of Delaware is mild and healthful. Autumn is particularly pleasant, and frosts seldom occur until about the middle of October, but they may occur in spring as late as the end of April. The average yearly temperature is 55°.

There is ample rainfall to ensure good crops, and although occasional droughts cause damage, rainfall is usually quite evenly distributed throughout the year. It averages from forty to forty-five inches.

Agriculture. Unlike its small sister state, Rhode Island, which concentrates on industry, Delaware presents a dual picture. In the north is a manufacturing center, in which are found some of the largest industries of the country; the remainder of the state is a great orchard and market garden for the Eastern coast. Over seventy per cent of the state is in farms, although the rural population is less than half the total.

The northern region is largely dairy farms, due to the demand for milk in the near-by cities. In the middle section is a fruit region, where apples rival in importance the peaches for which Delaware was once so famous. Potatoes, tomatoes, peas, small fruits, all are found here



Reminders of Early Days. At the left is the old courthouse and town hall, in New Castle. At the right, looking down a shady avenue, is the old statehouse, at Dover.

in abundance. Farther south, sweet potatoes, cantaloupe, and strawberries are the principal crops.

Grapes are increasing in importance, especially in the central section. Corn, hay, and wheat are the crops of greatest money value throughout the state. Delaware is one of the few Eastern states which raises more corn than is needed within the state. Although the soil is well suited to agriculture, the use of fertilizers in very heavy quantities is required for maximum production.

Stock raising, except dairy herds, is of minor importance. The raising of poultry is on the increase, especially in the southern county, although nearly all farmers raise some poultry for commercial purposes.

Minerals. The mineral resources of Delaware are not extensive, the most important being a large kaolin clay deposit in the northern part of the state.

Manufactures and Industries. Manufacturing is the chief industry of the state, the yearly output of manufactured goods being valued at over \$150,000,000. The most important industries are those relating to leather, textiles, bathroom and electric equipment, and rubber hose, foundry and machine-shop products, paper and wood pulp, canning and preserving, building of cars for steam railroads, ship-building, iron and steel, flour and grist, and lumber and timber products. Wilmington is the home office of the internationally known Du Pont company, founded in 1802, one of the greatest powder manufacturing companies in the world. Most of the industries are confined to the city of Wilmington, over forty-five per cent of the population of the state being centered in that section. The canning and preserving industries, however, are conducted outside of Wilmington, and the city of Milford has one of the world's greatest dental-supply manufacturing plants.

The fisheries of Delaware are growing, and many of the people are fishermen, who are sometimes farmers as well, making both land and water yield them profit. Shad, sea trout, perch, menhaden, and oysters are of commercial value. At Lewes a large factory manufactures oil from the menhaden, which is commercially important, both as oil and as fertilizer. It is said that the Indians taught the colonists the value of menhaden as fertilizer, telling them to put the fish under the corn hills at planting time.

Transportation and Commerce. No part of Delaware is far from navigable water or from railways which afford connection with the largest railways of the East. The total railway mileage is about 330 miles. There are only about 140 miles of electric railway. Many busses are being operated, both for passenger and freight service, over excellent roads.

An active coastwise trade exists between Wilmington and New York, those cities being connected by steamers. There is a rapidly growing foreign commerce through Wilmington. After 1918 concrete highway construction was pushed rapidly, so now all communities have fine hard-road connections, over seventeen per cent of the total road mileage in the state being of this character.

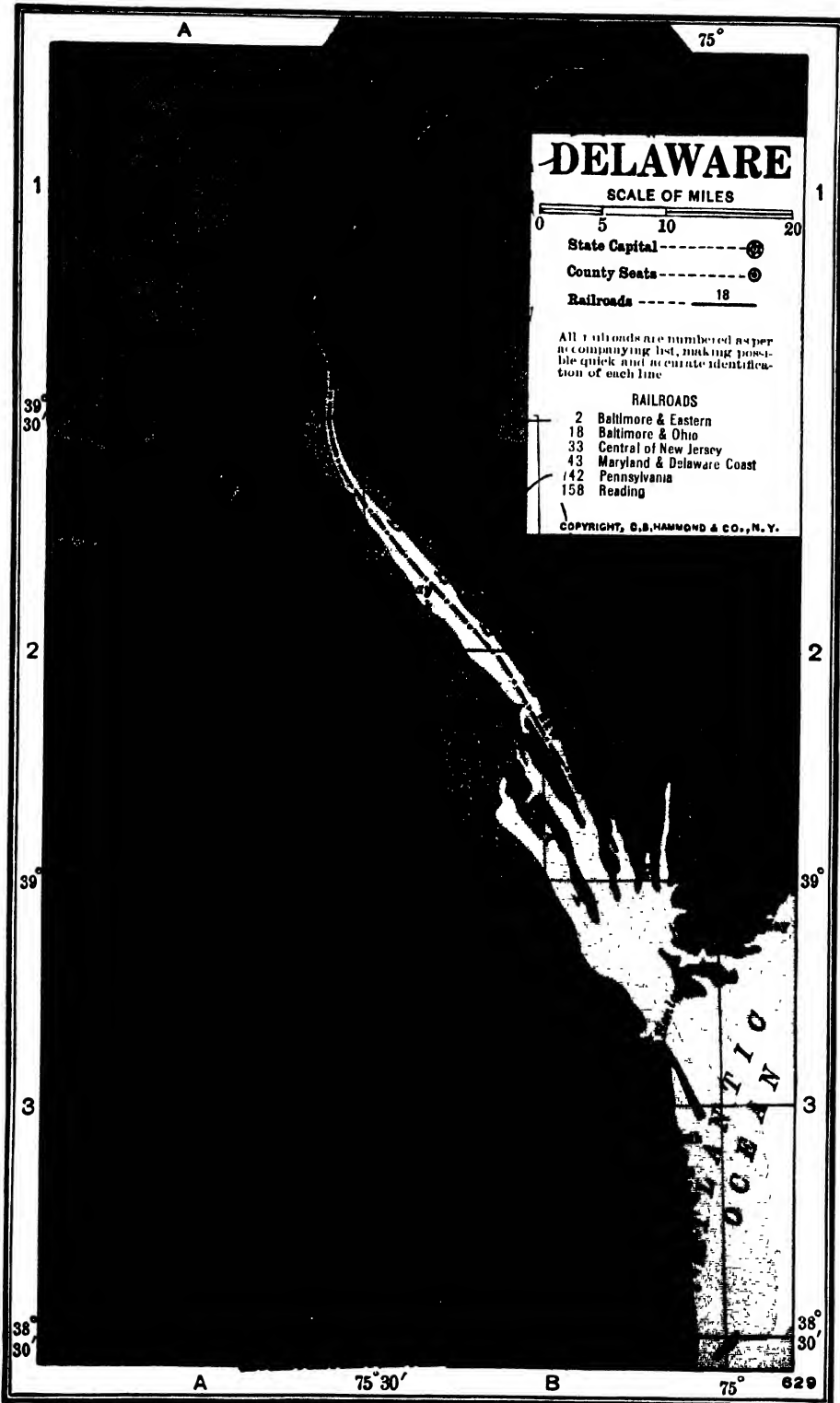
Government. After being governed under three constitutions, adopted in 1776, 1792, and 1831, Delaware adopted a fourth in 1897, and this, with a few minor amendments, constitutes the basic law of the state to-day. Delaware is divided into three counties, and each of those into hundreds, or districts, for local government.

Executive power is vested in a governor, lieutenant-governor, attorney-general, and insurance commissioner, each elected for four years, and in a state treasurer and an auditor of accounts, who serve two years.

The legislative power is vested in the general assembly. It consists of a senate of seventeen members, elected for four years, and a house of representatives of thirty-five members, elected for two years. Senators must be twenty-seven years old; representatives, twenty-four. A voter must be twenty-one years of age and able to read English and to write his name.

Judicial powers are vested in six judges, one of whom is chancellor, one chief justice, and the other four, associate justices. All are appointed by the governor and confirmed by the senate.

History. Although the Englishman, Lord de la Warr, sailed into Delaware Bay in 1611, the first settlement in the colony was made by the Dutch, just twenty years later. That trading post, which was situated near the present site of Lewes, was destroyed by Indians in 1633. In 1638 the Swedes made an attempt to secure a shore line in America by founding the colony of New Sweden, near the present site of Wilmington and extending as far as Philadelphia. The Dutch resented this invasion of what they considered their property, and within four years open conflict ensued. By 1655 the Swedes were driven out, and the Dutch took possession of all that section. When New Amsterdam, the present New York City, passed into English hands in 1664, Delaware also came under English control, and contention arose between the Duke of York and Lord Baltimore. In 1683, however, William Penn secured the territory; for twenty years it was governed as part of Pennsylvania, and known as the "Three Lower Counties on Delaware." In 1703 it was granted a separate assembly, but the authority of Pennsylvania's governor was acknowledged until the Revolutionary War.

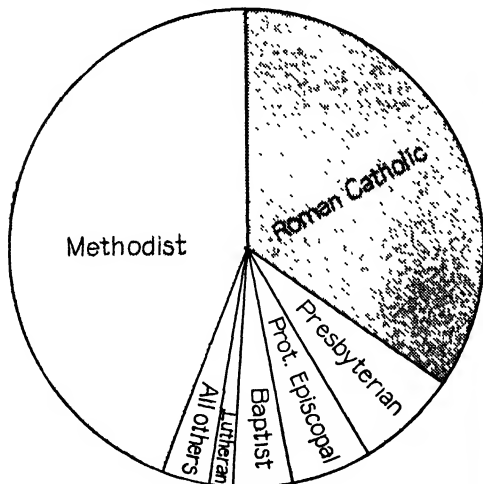


DELAWARE

Ashland, (A1) . . .	160	Concord, (A3) . . .	350	Harrington, (A3) . .	1,617	Millford, (B3)	2,703	Rockland, (A1) . . .	400
Bayard, (B3) . . .	220	Coolspring, (B3) . .	150	Hartly, (A2)	905	Millsboro, (B3) . . .	432	Roxana, (B3)	145
Beaver Valley, (A1) .	290	Dagsboro, (B3) . . .	223	Henry Clay Fac-		Millville, (B3)	112	Saint Georges, (A1) .	245
Bellefonte, (A1) . .	291	Delaware City,		tory, (A1)	1,000	Milton, (B3)	898	Seaford, (A3)	2,141
Bellevue, (B1) . . .	250	(A1)	1,064	Hickman, (A3) . . .	300	Montchaun, (A1) . .	130	Selbyville, (B4) . . .	462
Bethany Bch, (B3) . .	56	Delmar, (A3)	780	Hockessin, (A1) . . .	400	Mount Cuba, (A1) .	100	Smyrna, (A2)	1,953
Bethel, (A3)	222	DOVER, (B2)	4,042	Hollyoak, (B1) . . .	220	Mount Pleasant,		Stanton, (A1)	300
Blackbird, (A2) . . .	100	Edgemoor, (B1) . . .	500	Houston Sta., (B3) . .	150	(A1)	200	Stockley, (B3)	170
Blades, (A3)	388	Ellendale, (B3) . . .	250	Kenton, (A2)	212	Nassau, (B3)	150	Summit Bridge, (A1) .	130
Bowers, (B2)	174	Elsmere, (A1)	620	Kirkwood, (A1) . . .	120	Newark, (A1)	2,183	Taylors Bridge, (A2) .	250
Brandywine Springs,		Farmington, (A3) . .	124	Laurel, (A3)	2,253	New Castle, (A1) . .	3,854	Townsend, (A2) . . .	453
(A1)	100	Farnhurst, (A1) . . .	330	Lebanon, (B2)	200	Newport, (A1) . . .	676	Viola, (A2)	250
Bridgeville, (A3) . .	945	Felton, (A2)	771	Leipsic, (A2)	244	North Laurel, (A3) .	182	Whitesville, (A4) . .	100
Camden, (B2)	531	Frankford, (B3) . . .	443	Lewes, (B1)	2,074	Ocean View, (B3) . .	279	Willowgrove, (A2) . .	200
Cannon, (A3)	100	Frederica, (B2) . . .	611	Lincoln, (B3)	400	Odessa, (A2)	435	Wilmington, (A1) . .	128,500
Centerville, (A1) . .	200	Georgetown, (B3) . .	1,710	Little Creek, (B2) . .	156	Omar, (B3)	100	Winterthur, (A1) . . .	220
Cheswold, (A2) . . .	287	Glasgow, (A1)	100	Magnolia, (B2) . . .	177	Port Penn, (A1) . . .	273	Wooddale, (A1) . . .	200
Christiana, (A1) . . .	400	Greenwood, (A3) . . .	500	Marshallton, (A1) . .	430	Redlion, (A1)	100	Woodside, (A2)	300
Claymont, (B1) . . .	400	Grubbs, (B1)	100	Middletown, (A2) . .	1,260	Rehoboth Beach, (B3)	389	Wyoming, (A2)	661
Clayton, (A2)	872	Harbeson, (B3)	150	Midway, (B3)	100	Risingsun, (A2) . . .	300	Yorklyn, (A1)	390

Throughout the Revolution, Delaware soldiers rendered noteworthy service.

It is said that the nickname, *Blue Hen State*, was given to Delaware during the Revolu-



RELIGIONS IN DELAWARE

tionary War. A Delaware officer was heard to say that no cock was game unless it came from a blue hen, and thereafter Delaware soldiers were called *The Blue Hen's Chickens*. In 1776 an independent state government was formed. Delaware was the first state to ratify the Federal Constitution in 1787.

As a slave-holding state, Delaware furnished many recruits to the Confederate army during the War of Secession, but as a government, it remained faithful to the Union and was quick in its response to the call for troops. In recent years, political factions of the Republican party have fought for control of the state, and as a result, Delaware was without representation in the United States Senate from 1901 to 1903. Recent legislation has been concerned with laws concerning child labor, workmen's compensation, regulation of labor for women, public schools, income and direct inheritance taxes.

Other Items of Interest. Hudson discovered Delaware Bay and explored its mouth six days before he entered the Hudson River, but he did not proceed far inland, because the bay was too shallow.

The Indians who lived in this region at the coming of the white man were the Lenni Lenape, or "real men."

In Sussex County and the surrounding region, there is a colony of so-called "white Indians" or "Moors." Tradition declares that these are the descendants of Moors from Spain, but their exact origin is unknown. They themselves now claim to be descendants of the "Nanticoke tribe of Indians."

It was during a battle on Delaware soil that the new American flag was first unfurled on land, September 3, 1777. The spot where this occurred, Cooch's Bridge, is indicated by a monument

Questions on Delaware

(An outline suitable for Delaware will be found with the article "State.")

Give two popular names applied to this state, and explain both.

In what unusual way was the northern boundary of the state established?

Why were the Swedes and the Dutch so anxious to have control of this territory?

How many miles of railroad are there to one hundred square miles of area? How does the state compare in this regard with the state which most closely resembles it in size? With California?

Who was the real discoverer of Delaware Bay? Why did he not explore it?

What qualifications must a man have to enable him to vote in Delaware?

Where is the great breakwater? How much did it cost, and how long was it in building?

Who are the "white Indians," and what has tradition to say concerning them?

What industrial plant in this state outranks in age and size all others of its kind in the country?

What is meant by "hundreds"?

Has the state many navigable waterways?

What incident in the history of the American flag is marked by a monument in this state?

What is the average value of manufactured goods produced in Delaware each year?

What famous industry was located on the Brandywine at Wilmington in colonial days?

What is there of interest about the capitol building of the state?

Why should there be a close connection between agriculture and education in the state?

Does Delaware find it necessary to buy corn from the Middle West? Is wheat raising of recent importance?

When was the state school system reorganized?

What fruit is most closely associated in the popular mind with this state? Is it the most important now?

How many cities in this state have a population greater than 10,000?

How many cities the size of the capital of Delaware would the capital of New York make?

How many states have a population smaller than that of Delaware? How many have fewer people to the square mile?

What mineral is found here, and for what is it used?

Why should Delaware be interested agriculturally as well as commercially in the menhaden fishery?

What relation does Wilmington bear to the state as to population and manufacturing output?

What recent developments in transportation are of value to the farmers of the state?

What is there of historical interest at Lewes? Of commercial interest?

Why is there more dairy farming in the northern section of the state?

What engineering project besides the breakwater at Lewes has been of great aid to transportation?

Who made the first settlement on Delaware territory? When? How did the land come into the possession of England?

What is the population per square mile?

The first iron sailing boat made in the United States was built at Wilmington in 1854.

Delaware is the only state in which the whipping post is still a legal form of punishment for minor offenses.

The "hundreds," which correspond to the townships of other states, is an Anglo-Saxon method of division, older than the time of Alfred the Great.



DELAWARE WATER GAP
Location map at right

Because of its diminutive size, Delaware is frequently known as "The Diamond State," first so-called by Thomas Jefferson

More than one-sixth of Delaware's area, or 405 square miles, is water surface

H. V. H.

Related Subjects. The following articles in these volumes, even when they do not make specific mention of Delaware, contain information which will help to make clearer the life and activities of that state

Delaware, Thomas West Delaware Bay Wilmington

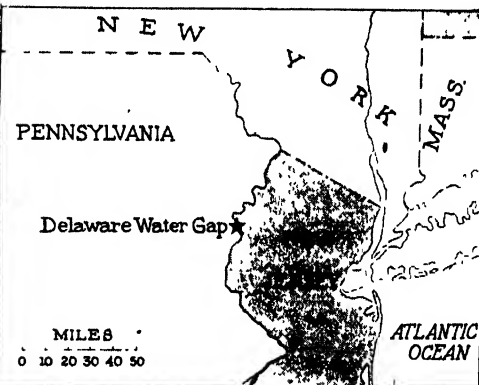
DELAWARE, O. See OHIO (back of map).

DELAWARE, OR DE LA WARR, THOMAS WEST, Lord (1577-1618), an English nobleman of colonial fame, the first governor of Virginia colony, in whose honor the state of Delaware and Delaware River and Bay were named. At the age of twenty-five, he succeeded to his father's estate and title and became a member of Queen Elizabeth's Privy Council. Having become interested in the plans for the colonization of the new lands in America, he was chosen a member of the Council of Virginia, in 1609, and on June 10, 1610, arrived at Jamestown as the first governor of the Virginia colonists. He first persuaded the discouraged settlers to give up the idea of returning to England, and then set himself to the task of bringing order and prosperity to the weak

settlement. In this he succeeded admirably, though he was much given to pomp and display.

After founding a settlement on the site of the modern Hampton, and building forts Henry and Charles, Lord Delaware started for the West Indies in 1611 to restore his failing health, but was driven by a storm into the river which now bears his name. He then returned to London, where he published his *Relation of the Condition of Affairs in Virginia*. In 1618, while on a second voyage to America, he died. See DELAWARE (History).

DELAWARE BAY AND RIVER, a continuous avenue of water transportation tributary to the Atlantic Ocean, separating New Jersey from Delaware and Pennsylvania. The river extends north to form the northeastern boundary between New York and Pennsylvania, and finds its source in the junction of two small streams in the Catskill Mountains, New York. The bay is about forty miles long and thirty-five miles at its greatest



width, and has a channel depth of thirty to sixty feet through its entire length. It is of great commercial importance, as it enables ocean-going vessels to reach Philadelphia, which lies on the Delaware River, fifty-five miles above the head of the bay. At the entrance of the bay, near Cape Henlopen, the Federal government has built a large breakwater to provide shelter for vessels, at a cost of \$3,000,000. Lighthouses have also been erected to warn ships of shoal water.

The river extends about 350 miles from its source to Delaware Bay, into which it flows about five miles below New Castle. The Schuylkill and Lehigh rivers are its most important tributaries. Its general course is southward, passing through the Kittatinny Mountains near Stroudsburg, Pa., and flowing through the gorge known as the Delaware Water Gap (which see). Tidewater is met at Trenton, after which the river becomes an inlet of the sea. After the Clyde, the Delaware

is the greatest shipbuilding center in the world, and it is an important means of commercial transportation for the busy cities of Trenton, Easton, and Camden. The Morris & Essex Canal from Trenton to New Brunswick also facilitates commerce, and the Delaware & Chesapeake Canal connects Delaware River with Chesapeake Bay. The state of Pennsylvania made a large appropriation for river and harbor improvements south of Philadelphia in 1905.

DELAWARE INDIANS. See INDIANS, AMERICAN (Most Important Tribes).

DELAWARE WATER GAP, a narrow gorge about three miles long, in the Kittatinny Mountains, sixty-five miles west of New York, close to the boundary between New Jersey and Pennsylvania, but in the latter state. This gorge, or canyon, was worn through the solid rock of the Appalachian range many ages ago by the Delaware River, when it was slowly forcing its way to the sea. The rocky walls on either side are very steep and high, rising almost perpendicularly 1,400 feet above the water. The scenery is very beautiful, and the surroundings are restful, two facts which combine to make Delaware Water Gap one of the most popular resorts in America. See NEW JERSEY (The Land); PENNSYLVANIA (The Land). See illustration, page 1882.

DELCASSÉ, *del ka sa'*, THÉOPHILE (1852-1923), a French statesman who was instrumental in developing a friendly understanding or "entente" among France, Russia, and England, which fortunately gave them common interests when the World War began in 1914. In 1894 he was appointed Minister of Colonies, and in 1898 received the portfolio of Minister of Foreign Affairs. He arranged the alliance with Russia, conducted delicate negotiations with England concerning African affairs, and acted as mediator between Spain and the United States. By seeking European alliances, he roused the suspicions of Germany, and his resignation was called for. He was soon reinstated, and in 1911 became Minister of Marine, in this position effecting great improvements in the French navy. In 1912 he again became Minister of Foreign Affairs, but during the next year was appointed ambassador to Russia.

In 1914 Delcassé returned to France, and was for a few months Minister of Foreign Affairs and then Minister of War. On the outbreak of the war, he again assumed charge of the Foreign Office, where he remained until October 13, 1915. He then resigned, ostensibly because of ill health; it is generally understood, however, that his resignation, like the withdrawal of Sir Edward Carson from the British Cabinet, was a protest against the hesitating policy which had permitted the conquest of Serbia by the Austro-German and Bulgarian armies.

DELEGATE, a person appointed by another or by a group, to act as his or its representative. In the United States Congress, the term is applied to a person elected to represent a territory, as distinguished from a state, in the House of Representatives. Each territory is entitled to send one delegate, who serves two years, receives a yearly salary of \$10,000, is allowed to speak and offer motions only on affairs concerning his territory, but may be appointed to certain committees. No delegate, however, may vote on any question. In Congress at the present time there are delegates only from Alaska and Hawaii. The Philippine Islands and Porto Rico send "resident commissioners to Congress." These men do not possess the rights of the territorial delegates, but are merely entitled to the privileges of the floor. See CONGRESS OF THE UNITED STATES; TERRITORY.

Origin of the Word. The word *delegate* is derived from the Latin *delegatus*, the past participle of the verb which means to *send*, or *appoint*.

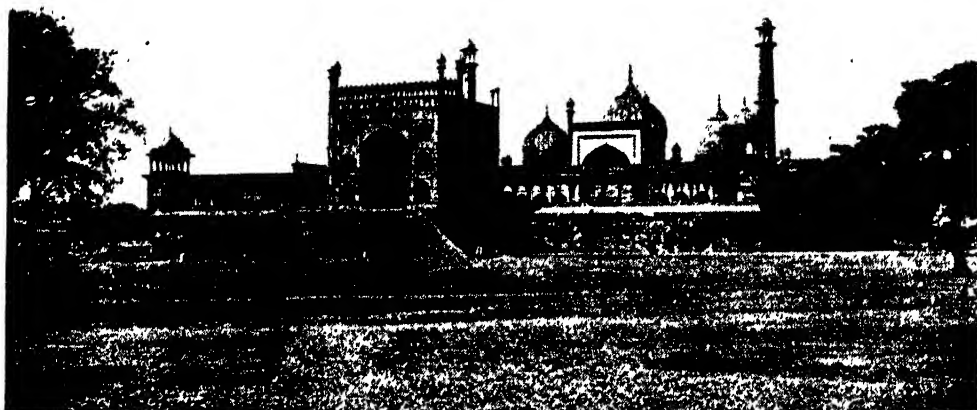
DE LESSEPS, FERDINAND. See LESSEPS.

DELFT. See NETHERLANDS, THE (The Cities).

DELGADO, *del gah' doh*, **CENTRAL TRADES SCHOOL.** See LOUISIANA (Education).

DELHI, *del' e*. This city, the capital of British India and the residence of the Viceroy, presents amazing contrasts of the old and the new, the splendid and the sordid. Its site on the Jumna River, in the southeastern corner of the Punjab, was looked upon with favor by Mogul emperors for centuries back, and one by one, six or seven Mogul capitals rose in splendor and fell into ruin on the land along the Jumna. The remains of these old cities cover an area of forty-five square miles about the present city, which owes its existence to Shah Jehan, famous builder of the Taj Mahal at Agra. Beginning the reconstruction of Delhi about the year 1638, he expressed his love of magnificent architecture in a group of imperial buildings erected within a walled enclosure extending along the river in the eastern part of the city. This is now called the Fort. The dreary barracks erected by the British have dimmed the splendor of the buildings and displaced most of the lovely fountains and gardens, but enough remains to reveal the impressive grandeur of the Shah's achievement. See SHAH JEHAN.

The Pearl Mosque and the Halls of Public and Private Audience are still the wonder of travelers. The former, which the emperor used for private devotions, is a small structure of white and gray marble, beautified by exquisite carvings and inlays of mother-of-pearl. There is an inscription in Persian in the Hall of Private Audience which suggests the beauty of that pavilion of white marble. Interpreted, it reads:



THE GREAT MOSQUE

Known locally as Jama Masjid, is one of the architectural splendors of the great Shah Jehan.

If heaven can be on the face of the earth,
It is this, oh! it is this, oh! it is this.

The Hall of Public Audience is still impressive because of its beauty of line and proportion, but its chief glory of former days was long ago carried away by the invading Persians. In a recess of the back wall stood a splendid jeweled throne, surmounted by figures of peacocks, the coloring of the outspread tails being the glow and sparkle of sapphires, rubies, pearls, and other gems.

Imposing mosques throughout the native quarter of Delhi look down upon mean, crowded streets and squalid dwellings. The most prominent of these is the Great Mosque, built by Shah Jehan in 1648-1650. Constructed of white marble and red sandstone, and surmounted by three white marble domes and two corner minarets, it is visible for miles around from its site on a small, rocky hill. Not far from the Great Mosque is Delhi's

famous "Silver Street," the Chandni Chauk. For its entire one-mile length it is the busiest thoroughfare in India; its bazaar, extending through the center, and its open-face shops on the sides, carry on a thriving trade in gold and silver filigree work, jewelry, wood-carvings, fabrics, and pottery, while the street itself is a constant moving picture of typical Oriental scenes.

Modern industry also has its place in this interesting city. Delhi is nearly the same distance northwest and northeast of Calcutta and Bombay, respectively, and is becoming a manufacturing and trading center. Modern flour mills look down upon the sumptuous dwellings of high-caste Hindus, who regard commerce as degrading, while sugar and cotton mills, with up-to-date machinery, provide employment for thousands of low-caste natives. There is an extensive trade in grain and other agricultural products, and the city



NEW GOVERNMENT BUILDINGS IN DELHI

Photo U & U

is a center of several railroads and caravan routes.

Delhi superseded Calcutta as the capital of British India in 1911. Since that date, a new European Delhi of fine houses, luxurious hotels, and imposing government buildings has been created beside the old Asiatic town. The city was the scene of imposing ceremonies in 1877, when Queen Victoria was proclaimed Empress of India, and of similar festivities in 1903 and 1911, on the accessions of Edward VII and George V (see **DURBAR**).

The city is now the center of the administrative province of Delhi, which in 1912 was taken from the old Delhi district of the Punjab. Population, about 305,000.

DELIBERATION. See **WILL**. (Psychology).

DELILAH, in Scripture, the treacherous mistress of Samson, the man of marvelous strength. Desiring to know wherein the strength of Samson lay, the lords of the Philistines bribed Delilah to discover the secret. Loving and trusting her, Samson told Delilah that his strength came from his long, thick hair; so while he was sleeping, Delilah cut off his locks, and he fell into the hands of his enemies. For the story of his revenge for this outrage, see the article **SAMSON**.

Meaning of Word. The name *Delilah* means a *drooping, or languishing, person*.

DELIRIUM TREMENS, *tre' menz*, a form of alcohol poisoning. As a result of prolonged use of alcohol, the patient develops a temporary mental and nervous disturbance. He has hallucinations, he sees animals and other objects where they are not, and he has trains of delirious thought, stimulated by what he imagines he sees. There is muscular tremor, and in extreme cases there are convulsions. Delirium tremens is fatal in about twenty per cent of cases, either through physical and mental exhaustion, acute mania, or infections which supervene. Alcohol should be withdrawn. Milk should be given. The patient should be given sedative warm baths. **W.A.E.**

DELLS OF THE WISCONSIN. See **WISCONSIN RIVER**; **DALLES**.

DE LONG MOUNTAINS. See **ALASKA** (Physical Characteristics).

DELOS, *de' lahs*. See **CYCLADES**, subhead.

DELPHI, *del' fi*. On the southern slope of Mount Parnassus, in a region of wild and picturesque beauty, was Delphi, an ancient town in Phocis, Greece, called Pytho in the stories of Homer. It was celebrated for its oracle of Apollo (see **ORACLES**), through which it became the religious center of Greece and the common altar of the Greek race. From a deep crevice in the rocks of Mount Parnassus issued overpowering vapors, assumed to be the divine breath of Apollo, and over this spot a temple was erected in honor of the

god. The priestess, known as the Pythia, who received the messages of the Revealer, sat upon a tripod over the crevice, and as she came under the influence of the stupefying vapors of the sacred spring gave utterance to his



Photo Visual Education Service

THE SACRED SPRING

words. Her mutterings were recorded by priests, who interpreted them in verse.

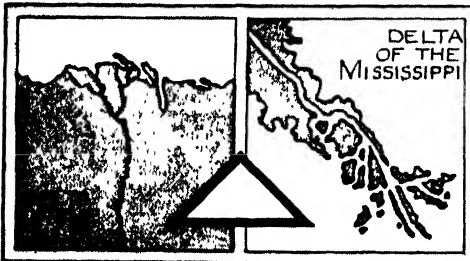
Though the answers were sometimes in the form of sensible advice, prophecies regarding the outcome of future events were often intentionally obscure or capable of being taken in different ways. Croesus, asking if he should make war on Cyrus, was told that if he did so he would bring ruin to a great empire; in the struggle that he at once brought about, it was his own empire that was destroyed. Not only did the Greeks freely consult the oracle, but in times of peril and anxiety the Romans and the monarchs of Asia made their way to Delphi, to seek advice upon which to shape their military and political strategy.

DELSARTE, *del sahr't*, **SYSTEM**, a system of relaxing physical exercises, including training in poise and breath control, devised by François A. Delsarte (see below). He taught that every expression of the face, every gesture, and every pose of the body is the outward expression of some inner emotion, and that every gesture, every pose, and every expression of the features has a characteristic effect on the emotions and on character. He was therefore a teacher of emotional expression.

The first step in teaching the Delsarte system is to subject the joints and muscles of the body to a relaxing process, to secure perfect freedom of movement, and to make the human organism pliable and responsive. The exercises are simple, and include special movements for the fingers, hand, head, trunk, foot, leg, lower jaw, eyelids, etc. The Delsartian movements develop grace and freedom of gesture, but they are not a system of gymnastics, nor are they adequate for the complete training of the physical organism.

François Alexandre Delsarte (1811-1871) was born at Solesmes, France. During a boyhood which was full of poverty and suffering, he developed a remarkable talent for music. Through the influence of a musician who discovered him writing down in the sand the music that was being played in the garden of the Tuileries, he was admitted to the Conservatory of Paris at the age of fourteen. Five years later, he began singing in light opera, but in 1834 was forced to leave the stage because of the failure of his voice. Thereafter he devoted himself to perfecting his system of expression, which he never put into writing, but which has been handed down by his followers. Delsarte was the composer of a number of songs and vocal exercises, and a mass which he wrote was performed in churches.

DELTA, a triangular-shaped tract of land at the mouth of a river, so called from its resemblance to *delta*, the fourth letter of the Greek alphabet (Δ), corresponding to the English *D*. The name was first applied to the silt or sand deposits built up into a fan-shaped



CHARACTERISTIC DELTAS

The triangular figure represents the Greek *delta*.

plain at the mouth of the Nile. Since that time, the same name has been given to alluvial deposits frequently found at the mouths of large streams flowing into lakes or gulfs, where the effects of tides and currents are comparatively slight. The main stream usually divides into two or more branches, each of which may be divided again and again. The size of the delta bears a close relation to the strength of the current in the body of water, as a swiftly flowing current carries off the shore line deposits, forming sand bars or coast islands, while slow or sluggish currents build deltas of considerable size.

The delta area of the Mississippi, nearly 12,000 square miles, contains several thousand acres of productive land; it is advancing into the Gulf of Mexico at the rate of one mile in sixteen years. The Nile delta, which has an area of 10,000 square miles, is very fertile. Other noted deltas include those of the Hwang, Ganges, and Po. As large rivers often change their channels near their mouths, delta lands are unsafe for dwelling places because of the danger of floods, but owing to their high fertility they can be used for agricultural purposes, if of sufficient elevation to be drained. R.H.W.

Related Subjects. The reader is referred in these volumes to the following articles

Erosion Nile River
Mississippi River River (Estuaries and Deltas)

DELTOID, *del' toid*, **MUSCLE**. See **ARM**.

DELUGE, *del' uje*. According to the Bible narrative, thousands of years before Christ the waters covered "all the high hills that were under the whole heaven" and destroyed all living things except those that had been permitted to seek refuge in the Ark built by Noah.

The familiar story, told in chapters VI, VII, and VIII of *Genesis*, is one of the most vivid and fascinating of all Bible tales. According to the account, the Deluge was sent to punish the wickedness of men, among whom only Noah and his family were deemed worthy of being saved. With them in the Ark were one male and one female of each living species. For forty days and nights the flood rose, "the fountains of the great deep were broken up, and the windows of heaven were opened."

After 150 days the waters began to subside, and in the seventh month the Ark rested on Mount Ararat. "Noah's dove," sent forth to test whether the earth were once more fit for habitation, returned after the first trial to find shelter and food in the Ark; the second time, it came back bearing an olive leaf; the third time, it did not return—a sign that the land was dry and beginning to yield as of old. Then, after having been a year and ten days in the Ark, Noah and his family again set foot upon the new earth, offered thanksgiving to God, and received the promise expressed in the rainbow, that "the waters shall no more become a flood to destroy all flesh."

The literal interpretation of the Biblical statement that the Flood covered the entire earth has been modified to harmonize with modern geological discoveries concerning the age of rock strata. Bible commentators now generally agree that either the narrative in *Genesis* described a flood of only local extent, or that the phrase "all the earth" was only relative, since only a small portion of the earth's surface was then known and inhabited.

The Biblical Story Verified. Excavations in 1929 on the site of the ancient city of Kish,

by archaeologists of the Field Museum of Natural History (Chicago) and Oxford University (England), uncovered proof that not only did the Deluge actually occur, but that there were two floods, about six hundred years apart. Each of these catastrophes destroyed Kish, which, however, was twice rebuilt, and became one of the world's earliest civilizations.

The Babylonian and Hebrew accounts of the Deluge were fully confirmed by the findings in 1929. Evidences of the flood were found at depths of forty-five and fifty-five feet below the surface of the great mound in which Kish is buried. The lower stratum has a thickness of eighteen inches. From traces of water damage, from tablets found, and from the depths of the deposits, it is estimated that the first flood occurred about 4000 B.C.; later, Kish was rebuilt, only to be devastated again by a greater deluge about 3400 B.C. This latter is believed to have been the Biblical Deluge in which Noah and the Ark figured.

Folklore. Nearly every nation has in its folklore a flood tradition similar in many respects to that of the Hebrews. The Greeks had the story of Deucalion's flood, told by the poet Ovid and familiar to students of Greek mythology. Babylon, India, China, Persia, Syria, Polynesia, and even ancient Mexico, Peru, and Cuba had their deluge legends. The Babylonian story exerted a strong influence on the Hebrew tradition, and because of its earlier dating it is thought by many to have been the model for the Bible narrative. The clay tablets on which the Babylonian, or Chaldean, account is engraved are known as the Deluge Tablets. Fragments have been unearthed and deciphered at various times, the first translation having been published in 1872 by George Smith, a famous English scholar in Assyriology, and others more recently, in 1910 and 1913.

Celebrated paintings of the Flood are those of Poussin, in Paris, and of Raphael, in the Vatican at Rome.

Related Subjects. The reader is referred in these volumes to the following articles:

Ararat Ark Deucalion Noah

DEMARCATIOn, *de mahr ka' shun*, LINE OF, the historical name of the boundary line established by Pope Alexander VI to settle the conflicting claims of Spain and Portugal to lands in the New World. By a Papal bull issued in May, 1493, he assigned to Spain all the lands its navigators had discovered, or might discover, west of a line running from north to south 100 leagues west of the Azores and Cape Verde Islands, provided such lands had not previously been in actual possession of any Christian prince or king; Portugal was to possess all the land discovered under the same conditions east of that line. After this con-

cession, Spain's possessions were known as the West Indies and those of Portugal as the East Indies. This arrangement proved unsatisfactory to Portugal, and the two countries in 1494



LINE OF DEMARCATIOn

The Pope's division of the Western world, as decided in 1494.

sent commissioners to Tordesillas, a Spanish city, and they succeeded in establishing the line 370 leagues west of the Cape Verde Islands.

Portugal, on the strength of the extension of this line, eventually claimed and secured Brazil, but disputes as to the exact determination of the line were frequent. A treaty was negotiated on April 22, 1529, at Saragossa, fixing the demarcation line 297½ leagues east of the Molucca Islands, but this arrangement was abrogated by subsequent treaties. France, England, and the Netherlands, the principal colonizers of North America, paid little attention to the Papal bull. See HENRY THE NAVIGATOR.

DEMENTIA PRAECOX, *de men' shi ah-pre' koks*. See INSANITY; MENTAL HANDICAPS (Juvenile Insanity).

DEMERARA, *dem ur a' rah*. See BRITISH GUIANA.

DEMES, *deemz*. See ATHENS.

DEMETER, *de me' tur*. See CERES.

DE MILLE, *de meel'*, CECIL B. (1881-), an American playwright, actor, and producer, known for his activities as a moving-picture director and manager. He was educated in the public schools, at Pennsylvania Military Academy, and at the American Academy of Dramatic Arts. Before he became associated with the moving-picture industry, in 1914, De Mille successfully produced several plays for David Belasco. As director-general of the Jesse L. Lasky Feature Play Company, and later, of the Famous Players-Lasky Company,

he became widely known for the originality and imaginative quality of the productions he supervised, reaching the height of public esteem with *The Ten Commandments* and *The King of Kings*. Subsequently, he became president of Cecil B. De Mille Productions.

Representative Photo Plays. De Mille's earlier productions include *Carmen*, *Joan of Arc*, *The Woman God Forgot*, and *The Whispering Chorus*. Especially admired were the following, with Thomas Meighan in the leading rôles: *Don't Change Your Husband*, *Male and Female*, *Why Change Your Wife?*, and *Manslaughter*. *The Affairs of Anatol* was an all-star production in which Wallace Reid played the title rôle.

DE MILLE, de mil', JAMES. See CANADIAN LITERATURE (English Canada).

DEMOCRACY, de makh'ra sie, a government in which control of affairs is vested in the mass of the people, who in their decisions are superior to the mandates of rulers. If a democracy exists in a country so small as to make it possible for all the voters to meet in one place to formulate policies and frame laws, that government is called a *pure democracy*; if the country is too large to make such personal action possible, the laws are made and executed by representatives chosen by the people, in which case the country is a *representative democracy*. England, Canada, France, and the United States are examples of the latter; Andorra and San Marino (which see), of the former. See GOVERNMENT.

DEMOCRATIC PARTY, officially known from the time of Washington's second administration as the Democratic-Republican party, and after 1829 as the Democratic party. It is the oldest political organization in the United States, and has been inspired by the political principles laid down by Thomas Jefferson, practically ever since the foundation of the Federal government.

Its Origin. All men were united in their effort to establish order, following the trying days of the Revolution. On the question of adoption of the Federal Constitution, public opinion was divided: one group, led by Alexander Hamilton, advocated its acceptance by the states without alteration; another group declared against such centralization of power as the Constitution threatened to impose upon the country, and maintained that the states should be invested with almost sovereign authority, to assure local self-government. The champions of the Constitution won, but the opposition obtained a promise that Congress, as one of its first acts, would propose a series of constitutional amendments guaranteeing certain inalienable rights to the people. Hamilton and other spokesmen for the Constitution, in the form in which it was passed by the Convention, became known as the Federalists. The natural designation of the opposition, headed by Thomas Jefferson, was Anti-Fed-

eralist, and this party was in every essential respect the beginning of the present Democratic organization.

Its Early Development. After the Constitution was adopted, the distinction between Federalists and Anti-Federalists became almost meaningless. All men joined in an effort to establish the new government as quickly as possible, and for two or three years party names were lost to view. In 1792, on the eve of the second Presidential election, there arose two active groups, the old Federalist wing becoming known as National Republicans and the followers of Jefferson as Democratic-Republicans. The former were successful in national contests until the year 1800, when the Democratic-Republican party elected Jefferson to the Presidency, and from this time party differences were more marked. All the elements in direct or passive sympathy with old Federalist tenets now aligned themselves with the National Republicans, but the hold of Jefferson and his theories upon the people was so strong that his party was retained in power through the administrations of its leader and the succeeding terms of Madison and Monroe. Chief among Democratic principles was the belief that a large army and navy were unnecessary, but emphasis was also placed on the need for economy in government, on the rights of the states, and on the desirability of avoiding foreign complications.

Strict adherence to these principles embarrassed the administrations and displeased the people, for the country was humiliated in a series of international incidents which ultimately led to war with Great Britain. Although it ended successfully and left an "era of good feeling" behind it, the nation was not satisfied, and in 1824 elected John Quincy Adams, candidate of the original Federalist element, or National Republican party. In this election, for the first time, Presidential nominations were not exclusively in the hands of a Congressional caucus; Adams was nominated by the state legislatures. The Democrats, largely owing to the unpopularity of the Adams administration, returned to power in 1829, with Andrew Jackson as President. During the succeeding eight years, Jackson welded together a party so strong that it has continued to the present day, either as the dominant party or as the strongest minority organization. See diagram of Presidential elections, in article PRESIDENT OF THE UNITED STATES.

The Problem of States' Rights. Since the days of Jackson, the career of the Democratic party must be divided into two parts. Until after the War of Secession, the campaign issue was always concerned with slavery or the tariff, and chiefly as a phase of a greater struggle to determine the relation of the individual state to the United States. South Carolina's nulli-

fication doctrine was based on the assumed right of secession. Although Jackson himself had no sympathy or patience with nullification, his party gradually came into the control of men who were unwilling to interfere with state institutions. Thus it happened that the Democratic party was driven to the defense of slavery.

After the War of Secession. At the close of the War of Secession, the Democratic party was in a peculiar position. The Southern Democrats were mostly disqualified from voting and from office-holding by the reconstruction measures; the Northern Democrats, as a party, were unpopular because they had opposed the vigorous prosecution of the war. The war had ended slavery and had eliminated the threat of secession, but there remained one great issue, the tariff, from the ante-war period. On this issue, the Democratic party won its only victories in national elections between 1856 and 1884. During the reconstruction period, the Democrats waged a vigorous fight against the Congressional policy of reconstruction, and later they took issue on financial measures. The inefficiency in the government under Grant gave the Democrats an issue which nearly resulted in the election of Samuel J. Tilden. Civil service reform and lower tariffs were the campaign cries which elected Grover Cleveland in 1884 and 1892, and lower tariff was the chief plank of the Democratic platform in 1912, when Woodrow Wilson was elected.

In 1916 the underlying issue was the personality of the candidates, but the Democratic party practically stood on its record, which the Republicans attacked with vigor. The campaign was notable for the large number of issues which were discussed—among them the Mexican situation, a proposed constitutional amendment to provide national woman suffrage, the threatened railway strike, and the Adamson railroad labor law, and most important of all, the government's attitude toward the European nations, especially Germany. Wilson was reelected on his plea that he "kept us out of war."

In still another way, the War of Secession marked a break in Democratic policy. From 1801 until 1861, the Democrats had been successful in every Presidential election except three. Tyler, moreover, who had been elected with Harrison on the Whig ticket, turned out to be more of a Democrat than a Whig. Before the war, the Democratic was the majority party. It was essentially conservative, unwilling to advocate new doctrines; these were left to the Whigs, the Free-Soilers, and the Republicans. After the war, the Democratic was a minority party; it had to march to the attack, and in consequence, it gradually became more progressive, while the Republican party

in its doctrines was more inclined to conservatism. Contrary to the known fact that the responsibilities of office make for conservatism, the progressive tendency of the Democratic party became more strongly marked after its return to power in 1913. This condition was generally attributed to the lesson taught by the formation of the Progressive party in 1912. The Democratic leaders realized the forward-looking tendency of the times, and set their course accordingly. However, with the election of 1920, the Republican party was returned to power with the greatest popular majority ever recorded up to that time; in 1924, in another Republican victory, the majority for candidate Coolidge was even larger. In 1928 the Democratic candidate, Alfred E. Smith (which see), polled more than 15,000,000 votes, but he won only eighty-seven votes in the Electoral College. E.D.F.

Related Subjects. The reader is referred to the following articles in these volumes.

Adamson Law	Jefferson, Thomas
Anti-Federalists	Nullification
Democratic-Republican Party	Political Parties
Federalist Party	Reconstruction
	Republican Party

DEMOCRATIC-REPUBLICAN PARTY, an early political organization in the United States, formed from a faction of the Anti-Federalists; their theory aimed at direct popular control over the government, the gradual extension of the right of suffrage, the limitation of the powers of the Federal government, and strict conservation of the powers reserved to the state governments by the Constitution. It was a party of construction, but was influential only a short time under the name it adopted. The same principles that it advocated were first advanced by what was known at the time of the adoption of the Constitution as the Republican party. The Democratic party is the logical successor of the Democratic-Republican organization. See **POLITICAL PARTIES; BUCKTAILS.**

DE MOLAY, ORDER OF, an organization founded in 1919, and sponsored by the Masonic fraternity, for the sons of Masons and their friends between the ages of sixteen and twenty-one. To a slight extent, its ceremonies are patterned after those of Freemasonry; it employs a ritual, secret symbols, and passwords, and provides two degrees in initiating new members. Each member is pledged to live and think cleanly, to strive to be a good son to his parents, to offer a prayer daily for his father and mother, to promote the public schools, and to honor womanhood. Headquarters of the Order are in Kansas City, Mo. Its chapters have spread throughout the United States; it is represented also in all insular possessions, and in Canada, Mexico, France, Panama, and Australia.

De Molay. The Order derives its name from Jacques de Molay, a medieval Frenchman, one of the historic heads of the Order of Knights Templars. He conducted several expeditions against the Saracens, and was put to death by order of Philip the Fair of France, because of his leadership in the secret organization.

DEMONOLOGY, *de mon ol' o ji*, the belief in the existence of demons, commonly in the sense of *evil spirits*. The belief was elaborated in medieval times and led to such legends as those of Faust and the Witches' Sabbath. Its discussion is pertinent to the consideration of witchcraft (which see). See FAUST. J.J.

Relating to Various Beliefs. The articles on the following topics, while not bearing on demonology, are of interest in this connection:

Alchemy	Occult
Astrology	Palmistry
Clairvoyance	Phrenology
Conjuring	Physiognomy
Divination	Psychical Research
Faith Cure	Psychoanalysis
Hypnotism	Spiritualism
Magic	Subconscious
Medium	Suggestion
Mesmerism	Superstition
Mind Reading	Telepathy
Necromancy	Trance

DEMOSTHENES, *de mos' the neez* (about 383-322 B.C.). Though the fame of Demosthenes centers about his marvelous gifts as an orator, a study of his times reveals that he was first of all a patriot. His whole life was devoted to furthering the political freedom of Athens, and though in the end he failed of his object, his sincerity and intensity of purpose wrought in Athens a higher life.

He lived at a time when the culture and achievements of Hellenic civilization were threatened by barbarian violence. The danger was imminent, because of the decline of public spirit on the part of the citizens of Athens. To arouse a greater interest in public affairs and a greater devotion to the common welfare was the life work of Demosthenes.

He was born in Attica, the son of a wealthy manufacturer, who left his property and his

children to the care of three guardians who proved unworthy of the trust. When Demosthenes came of age, he argued and won his first case in the law courts, a suit against the dishonest guardians. This and other successes made him resolve to enter public life, and to that end, he mastered Greek law and politics and the art of oratory. Laboring under disadvantages that would have discouraged the average youth—a harsh and unmusical voice, weak lungs, and awkward movements—he made his name a synonym for eloquence by the severest self-discipline. The story is told that he practiced reciting as he climbed steep hills, and that he defied the roar of the waves upon the seashore to drown out the sound of his voice.

From the time he was twenty-five until his death, Demosthenes gave himself with unselfish devotion to the cause of Greek liberty. He saw, as his countrymen did not see, that the weak and disunited Grecian states were doomed to fall a prey to the designs of Philip of Macedon, and he denounced that crafty monarch in a series of harangues, the famous *Philippics*, that have given their name to all modern speeches characterized by bitter invective. In 338 B.C., when Philip led his army through the Pass of Thermopylae and seized the city of Elatea, the orator persuaded the Athenians to form an alliance with Thebes and to fight for the freedom of Greece.

Though the allies suffered a crushing defeat at the Battle of Chaeronea, Demosthenes urged the Athenians not to lose courage and to repair their city walls. When Ctesiphon proposed that the great patriot be awarded a golden crown for his services, he was charged by Aeschines, the rival of Demosthenes, with having made an illegal proposal. To this charge Demosthenes replied with what critics agree in calling the most perfect masterpiece of oratory that has ever been delivered—the oration *On the Crown*. As a result, Aeschines left Athens and went into permanent exile.

On the accession of Alexander the Great to the throne of Macedon, Demosthenes endeavored, without success, to unite the Greeks against the conqueror. In 324 B.C. he was imprisoned on a false charge of having received a bribe from one of Alexander's generals, but succeeded in making his escape; the following year, on the death of the Macedonian ruler, he returned in triumph to resume his leadership in Grecian affairs. The states of Greece then united against the Macedonian general, Antipater, carrying on with him the so-called Lamian War (323-321 B.C.). The effort was disastrous, and Demosthenes, who had been the very heart of the struggle, preferring death to falling into the hands of Antipater, took his own life by poison.

B.M.W.

Related Subjects follow, on page 1891.



DEMOSTHENES

From a bust in the Vatican, Rome.

Related Subjects. The reader is referred to the following articles in these volumes:

Aeschines
Alexander the Great
Greece (History)
Philip of Macedon

DEMPSEY, WILLIAM HENRY [Jack]. See PRIZE FIGHTING.

DEMURRER, *de mur' ur*, in law, a written statement or pleading, in behalf of a defendant, which admits the facts in evidence but denies that such facts are sufficient to maintain the issue or constitute a good cause of action or defense. Demurrers are *general*, where no particular cause is assigned, or *special*, where the particular defects are pointed out. The effect of a demurrer, when allowed, is to put an end to the suit, unless the court gives the plaintiff leave to amend or unless it is confined to only a part of the complaint. In many states, it takes the place of a motion for a non-suit or order of dismissal of the suit. See COURTS (Court Procedure).

DENARIUS, *de na' ri us*, the name of a silver coin of the Romans during the periods of the empire and the republic. In the former period, its obverse bore the heads of the em-

perors; later, historical and mythological characters were substituted. It was first issued in 269 B.C., and disappeared from circulation in the third century A.D. Its value was ten, and later sixteen, of the coin called *as*, equivalent to about seventeen cents in American or Canadian money. The name also applied to a small gold coin struck during the days of the empire, and to one of copper issued in A.D. 296 by Emperor Diocletian. The latter was the penny of the New Testament. Its initial, *d*, is the English symbol for penny, or pence.



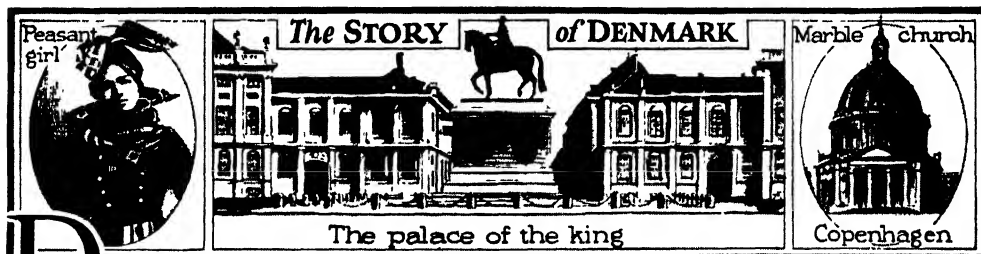
DENARIUS OF CAESAR

DENATURED ALCOHOL. See ALCOHOL, subhead.

DENBY, EDWIN. See COOLIDGE, CALVIN (Teapot Dome Investigation).

DENDRITE, *den' drite*. See NERVOUS SYSTEM (Structure of Nerve Tissue).

DENISON, TEX. See TEXAS (back of map).



DENMARK, a peninsula-and-island kingdom of Europe, the smallest of the three Scandinavian countries. The Baltic Sea, The Sound, and the Cattegat separate it from Sweden on the east; the Skagerrak lies between it and Norway on the north; and across the North Sea lies Great Britain on the west. On the southern boundary lies Schleswig-Holstein, formerly a part of Denmark. In 1920, following the World War, by vote of the people in the area, the northern part of Schleswig-Holstein was returned to its old allegiance, the people preferring Danish rule. Comprising the Jutland peninsula, a group of adjacent islands lying in the Baltic east of the peninsula, the island of Bornholm, farther east and south of Sweden, and the Faroe Islands, north of Scotland, the kingdom of Denmark covers an area of 16,574 square miles. It is only about one-eighth the size of its neighbor, Norway; still its population of about 3,500,000 is greater than that of the larger country. Its lands support in prosperity and contentment 211 people to the square mile, nine times Norway's average.

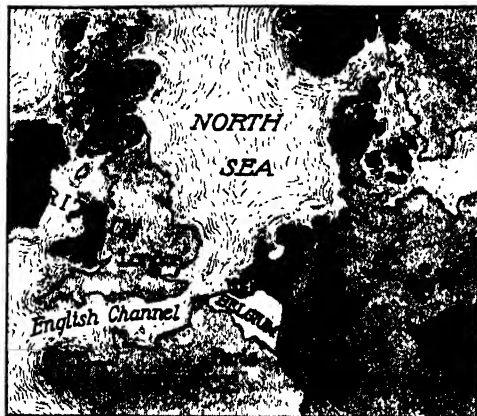
Iceland, an island situated 500 miles northwest of Scotland, has been under the crown of Denmark since 1280, except for a brief period during the Napoleonic wars, when it was subject to England. It has enjoyed home rule since 1874, and although it has been virtually independent since 1918, it acknowledges the king of Denmark as its sovereign. See ICELAND.

Greenland, the largest island of the world, is a colony of Denmark. It is thinly populated, for it lies in an Arctic region, largely covered by the ice that for long ages has accumulated upon its surface. Its southern end is not far from Northern Labrador; its northern extremity lies in unexplored regions. This land of the Eskimo and polar bear is directly under the government of Denmark, and became one of that kingdom's possessions during the eighteenth and nineteenth centuries. Its trade is a state monopoly, though in 1924 Norway was guaranteed certain commercial rights.

Three islands of the West Indies, Saint Croix, Saint Thomas, and Saint John, known as the Virgin Islands, belonged to Denmark until 1917, when by sale they were transferred

to the United States for \$25,000,000. See VIRGIN ISLANDS OF THE UNITED STATES.

The People, Their Language, and Religion. Descendants of a race of heroes and conquerors, the Vikings of history and literature, the Danes



DENMARK (IN BLACK)

are a Germanic people, with light hair and blue eyes. For centuries they have been farmers and fishermen. They are intelligent, industrious, and hospitable, and make bold and hardy seamen. These people have preserved many of the manners and customs of early times. Their language is like Swedish and Norwegian, but more soft and rather monotonous, with shades of sound difficult for foreigners to acquire. The Danish language is used to a large extent by the educated classes of Norway, where it became the written language through the one-time union of Norway with Denmark. It is written either in German or Roman characters. The established religion of Denmark is Lutheran, but all creeds are welcomed.

The Cities. The capital of Denmark is Copenhagen, a beautiful city of about 750,000 people; it is described in these volumes under its title. Other cities of importance are the following:

Aalborg, all' bork, the commercial center for northern Denmark, is situated on the Limfjord, somewhat inland from its entrance, on the eastern coast of Jutland. It is a very ancient city, and an old castle and some picturesque houses of the seventeenth century still stand. The present town manufactures brandy, cotton goods, cement, and lumber. Fish is the leading article of export. Population, 42,800.

Aarhus, aw' hoos, is a very old town and a seaport, on the eastern coast of the peninsula of Jutland. It is noted primarily for its great Gothic cathedral, which dates from 1201 and is the oldest Christian church in the kingdom. Aarhus has been the seat of a bishop since the year 948. Next to Copenhagen, the capital, it is the largest city and trade center. Population, 76,230.

Odense, o' then sa, the birthplace of Hans Christian Andersen, is a seaport, situated on the island of

Fünen, four miles inland from the Fiord of Odense, with which it is connected by a canal. It is an important leather market, and has also large iron foundries, machine shops, sugar refineries, glass, chemical, and tobacco factories, and weaving mills, and carries on a thriving trade in butter, bacon, cheese, and eggs. Odense is one of the oldest cities of Denmark, and is said to have been founded by and named for the Norse god Odin. In the sixteenth century, several important parliaments were held there; during the Middle Ages, the shrine of Canute, the patron saint of Denmark, was visited by many pilgrims. The city has a population of 52,300.

Physical Features. Denmark, islands and mainland, is for the greater part built up of the sand tossed up by the sea and blown inland by the winds.

Jutland, the only portion of the country which is a part of the continental area of Europe (the remainder of the country consists of islands), forms a peninsula thrusting out to the north from Germany between the North and Baltic seas, and separated from Norway and Sweden on the north by the waters of the Skagerrak and the Cattegat. It was known to the ancients as the Cimbric Peninsula, or Chersonesus (which see). The low, sandy west and northwest coasts of Jutland form a region of fiords and dunes and shallow lagoons, or inclosed bays, which are useless as harbors.

The surface of the whole western half of the peninsula is low, and is covered with dreary dunes and heaths, which may have had its effect on the temperament of the Jutlanders, a people of somewhat sober disposition. A low range of hills, the highest point of which is about 600 feet above sea level, extends across the middle of Jutland. Continuing east across the peninsula and throughout the islands of the archipelago are found fertile lowlands dotted with ridges of hills.

The eastern coasts, especially of the islands, have several excellent harbors. The most important belonging to Zealand Island, at Copenhagen, the capital. Stretching across Jutland from the east are interesting fiords, the most remarkable being the Limfjord, which, winding in and out, crosses the peninsula at the north. The largest islands of Denmark, Zealand and Fünen, divide the outlet of the Baltic Sea into three belts, from Jutland to Sweden—the Little Belt, the Great Belt, and The Sound.

Although there are many streams and lakes, well stocked with fish, the only river of note is the salmon-stocked Guden, eighty miles long, which is navigable part of its length. About six per cent of the area of Denmark is forested, beech trees being most abundant. The land surface consists largely of clay and sand, and in the west and north of Jutland are moorlands of peat.

Zealand, or Seeland, ze' land, in Dutch *zah' lahnt*, is the island on which Copenhagen,



TYPICAL DANISH LANDSCAPE

the capital, stands. It is separated from Sweden by the narrow strait called The Sound, about ten miles wide; it is about fifteen miles east of the Danish island of Funen. The island covers an area of 2,682 square miles, and has a very irregular outline, the rocky coast being indented by bays and fiords. There are several rivers, but the largest is only fifty miles long. Agriculture and cattle breeding are the principal occupations, the island being noted for its dairy products.

A hundred miles east lies the rugged and picturesque island of Bornholm, its granite cliffs rising abruptly out of the Baltic, and providing practically the only mineral resources of the kingdom.

Climate. The land of the sturdy Dane is one of frequent heavy rains and mists, and it has a climate much like that of Eastern Scotland. The average temperature in summer is 60° F., and in winter 32° F.; the annual rainfall ranges between twenty-one and twenty-seven inches. In Jutland, sand storms are often experienced, and the climate there is never as mild as on the islands.

Industries. Denmark is largely a rural country. Despite the vast areas of bogs and moors in Western Jutland, the eastern half of the peninsula is fertile and productive; oats, barley, rye, and beetroot are cultivated extensively, and the inhabitants are also engaged in cattle raising and dairying. Almost everywhere throughout the islands may be seen fields rich with oats, barley, rye, wheat, potatoes, and beets, and pastures and meadow lands dotted with grazing cattle. Eighty per cent of the area of Denmark is productive; six per cent is beech-covered forest land.

Nearly forty per cent of the population lives directly by agriculture, and as the law forbids the forming of large estates, the number of peasant farmers is large. They are a thrifty people, and many of them own their own holdings. The progressive Danes believe in coöperation, so expensive machinery and improved methods have been installed through the united efforts of the farmers, and the dairying industry in particular has grown to wonderful proportions. Danish butter is famous even outside of Denmark, and millions of dollars' worth are exported every year. The livestock also provide Denmark with valuable exports; cattle and swine are raised in great numbers, and poultry by the millions. The eggs are shipped to neighboring countries, chiefly to Great Britain.

Although manufacturing industries are growing, the lack of coal has been a handicap to their development. The principal manufactures are furniture, porcelain, and wearing apparel. Much of the latter comes from the knitting needles of the female population, from tiny girls to their grandmothers. Many peasants also spin and weave in the old-fashioned way.

The royal porcelain works at Copenhagen have a large yearly output of gracefully designed pottery. Other manufactures include beet sugar, margarine, and brandy and beer. Denmark is the poorest of European countries in mineral resources, no metallic ores being found. Peat is a valuable yield of the bogs of Northern and Western Jutland. Being surrounded by water and indented far inland by fiords, Denmark has developed a fishing industry that is notable among the countries

of the world, amounting to several million dollars a year. Herring, turbot, salmon, oysters, and seals are the most profitable.

Transportation, Communication, and Commerce. The internal traffic of the kingdom is handled on 3,150 miles of railway, more than half of which belongs to the state. There are



NATIONAL COSTUME OF DANISH WOMEN

more than 4,700 miles of good roads and 23,600 miles of byways. Plying back and forth between the islands and the mainland, steamers keep up constant intercourse among the various cities, most of which are located on the coast or on navigable waters.

The commerce of Denmark and its colonies, conducted chiefly with Great Britain, Germany, United States, Sweden, Norway, and Russia, is handled by over 2,000 vessels. The chief articles of export are animal and dairy products, butter, pork, eggs, margarine, and lard; the imports include cereals, cotton, iron goods, textiles, and coal; the latter is an important item on the list.

Education. Provisions for public elementary education were made in the beginning of the nineteenth century, and in 1814 school attendance for children between the ages of seven and

fourteen was made compulsory. Education is widely diffused, and the percentage of uneducated people is very low. In over 4,500 public elementary schools and over 700 private schools, about 500,000 children are enrolled. For higher education, besides the University of Copenhagen, founded as early as 1479, there are high schools, veterinary, agricultural, and art schools, as well as a college of pharmacy and a Polytechnic Institution.

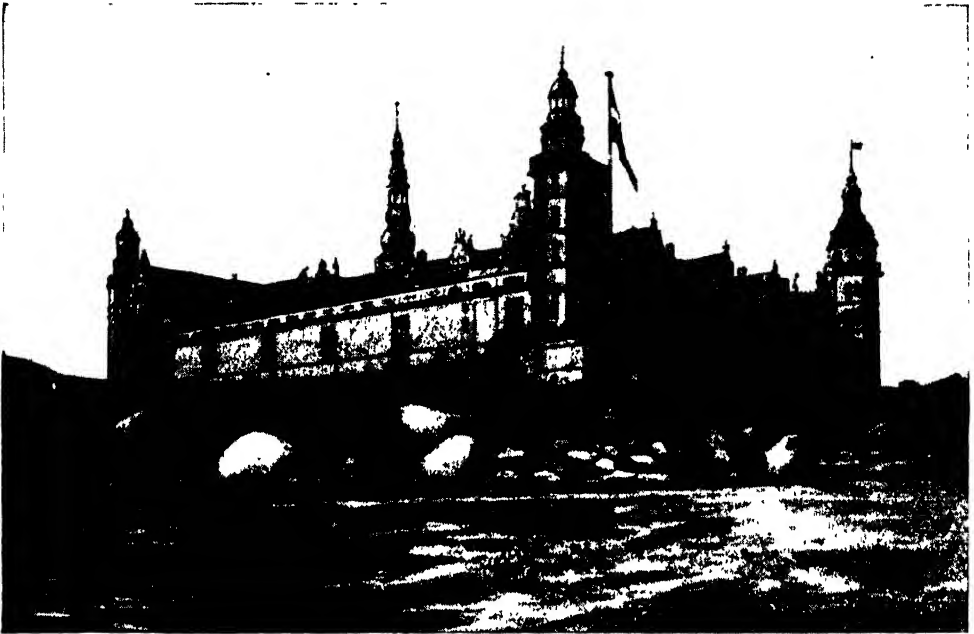
Literature and Art. The earliest literary contributions from Denmark were in Latin, the oldest books dating back to the second half of the twelfth century. The first really literary writings were ballads about heroes, love, and historical events, which for centuries had been told and retold before being placed in writing.

The first Danish printing press was set up in 1490, and in 1550 Christian Pedersen printed a translation of the Bible in Danish, thereby doing for the Danish language what Luther did for the German. Although Hans Christian Andersen (1805-1875) is the only Danish writer who has gained a world-wide reputation, a number of others have contributed works whose beauty and strength are acknowledged by those who read and understand the language. Ludwig Holberg (1684-1754) is considered the founder of Danish literature and of the Danish drama. Johannes Ewald (1743-1781) is Denmark's greatest lyric poet, and the influence of the works of the poet and dramatist Adam Oehlenschläger (1770-1850) is felt to this day. Georg Brandes (1842-1927), critic and literary historian, has introduced into Danish thought and letters more modern European ideals and tendencies than any other man. Among other writers of the nineteenth century are Herman Bang (born 1858) and Edward Brandes (born 1847), the dramatist brother of Georg Brandes.

The greatest sculptor of Denmark was Bertel Thorvaldsen, or Thorvaldsen (1770-1844), whose works of genius are displayed in the Thorvaldsen Museum at Copenhagen. Among later artists are the painters Marstrand, Carl Block, and Otto Bache. Hartmann, Gade, and Heise are the chief Danish composers of music.

Government. Denmark has been a constitutional monarchy since 1849. Agitation for constitutional reform commenced in 1913, and the adoption of a new Constitution in 1915 reduced the political powers of landholders and extended full suffrage to women.

Executive power is vested in the king, who must be a member of the Evangelical Lutheran Church, and in a council of nine ministers. The right to make and amend laws rests with a Parliament called the *Rigsdag*, or *Diet*, meeting annually and acting with the sovereign. The *Rigsdag* is composed of two houses, the *Landsting*, or Upper House, and the *Folkething*, or House of Commons. The *Landsting*



KRONBORG CASTLE, SCENE OF THE TRAGEDY OF HAMLET

Here, or it may have been in the grounds of the predecessor of this castle of the Middle Ages, occurred the scenes immortalized in Shakespeare's tragedy of *Hamlet*. The castle is on a peninsula near Elsinore, on the northern coast of Denmark, and within sight of the shores of Sweden. In the stormy times of long ago it was both a fortress and residence of the Vikings, and within its walls is the tomb of Holger Danske, the founder of Denmark. The story of Hamlet came out of the dawn of the thirteenth century, and although Ophelia's name did not appear in the early version, yet tradition has fixed upon the sequestered spot in the castle ground where she was buried. The scenes of the tragedy and the grave of Hamlet are pointed out to tourists.

has seventy-five members, elected for eight years, the Folkething consists of 140 members, elected by popular vote for four years.

All men and women of fixed abode and good reputation and over twenty-five years of age possess the franchise and are eligible to hold office.

For the purpose of local government, Denmark is divided into twenty-two counties, or *amter*, each *amt* having a governor, or *amtmand*. The counties are divided into hundreds, or *herreder*, and they in turn are divided into parishes. In the towns, there is a mayor appointed by the government, the larger cities also having boards of aldermen. Copenhagen, the capital, has its own special form of government.

History. The early inhabitants of the mainland of Denmark were those warlike Germans, the Cimbri. They were overcome by Angles, Saxons, and Jutes, and when the latter tribes invaded England, the Danes of the island of Zealand entered the Continent, and by reason of their adventurous spirit soon made their presence felt throughout Europe. The tales of these Northmen, or Viking, tribes are many and interesting.

From the eighth century, Danish kings were heard of, but the first prominent one was Svend I (about 985). He was followed by his son, the great King Canute, who conquered England, and during those reigns, the Danes were converted to Christianity.

After Canute's death in 1035, there was much internal dissension and loss of possessions, but from 1157 to 1241, under Valdemar I, Canute VI, and Valdemar II, Danish conquests again extended Denmark's power into other lands. After that, again in the hands of weak rulers, the country lost power and prestige. Finally, however, from 1375 to 1412, under the rule of Margaret, daughter of Valdemar IV, the country was given a strong government, and by

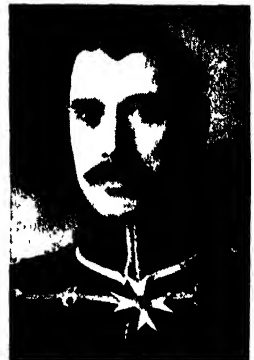


Photo Brown Bros.

CHRISTIAN X



HERE HAMLET LIES BURIED

Stone monument placed in the summer of 1926 over the mound where, tradition declares, Hamlet lies buried, in the park at Marienlyst, Helsingør, Denmark—the Elsinore of Shakespeare.

the Union of Kalmar, in 1397, Denmark, Norway, and Sweden were united under her sovereignty. She appointed her nephew Eric as her heir. He had none of her great qualities, however, and he undid much of her excellent work. Tired of misrule, in 1448 the Danes chose Christian I as king, and he became the founder of the royal family of Oldenburg, which ruled until 1863, a period of 415 years. Christian was also chosen ruler of Schleswig and Holstein, and so kings of Denmark received recognition in the German Parliament.

Christian II took the throne in 1513, but his tyranny resulted in the loss of Sweden, that country gaining its freedom under Gustavus Vasa (see GUSTAVUS); it was never again united to Denmark. The cruelties of Christian II cost him the throne in 1523, and his uncle Frederick I was chosen king, ruling for ten years. During the reign of his successor, Christian III, Protestantism was established. During the sixteenth century, Denmark began to have a part in European affairs, and during the reign of Frederick II (1559-1588) it was the mistress of the northern seas. Christian IV (1588-1648), one of the most able rulers of Denmark, took part in the Thirty Years' War (which see).

Until 1660, choice of a king was by election, and so the power of the nobles grew while the peasants were oppressed; through the resulting internal unrest the power of Denmark weakened. In 1660, however, Frederick III succeeded in having the kingship declared hereditary in his family; the power of the nobility

was lessened, and many improvements in administration were introduced. Not until the rule of Christian VII (1776-1808), however, was serfdom abolished.

Through its relations with Napoleon, Denmark became involved in war with Sweden, England, Russia, and Prussia, thereby losing its fleet to England in 1807, and being forced in 1814 to cede Norway to Sweden. Soon trouble started with Denmark's German subjects in Holstein and Schleswig. Rebellion and discontent were put down and held in check for a number of years, but finally Prussia and Austria determined to unite in settling the Schleswig-Holstein matter, and in 1864 war was begun on Denmark. As a result, Schleswig-Holstein passed to Prussia, but after the World War, the northern portion of the province was restored to Denmark.

Of late years, one of the most important events in Danish history was the necessity of granting a constitutional government to Iceland, and virtual freedom in 1918. Through the marriage of children of Christian IX into many reigning families of Europe, during the latter half of the nineteenth century, Denmark came into very close relationship with many European powers; during his later years Christian IX was called the "father-in-law of Europe." At his death, in 1906, his son Frederick VIII succeeded him. For six years the latter was a democratic and popular ruler; his sudden death raised his son to the throne as Christian X, under whom the country has been peaceful and progressive.

OUTLINE AND QUESTIONS ON DENMARK

Outline

I. Location and Character

- (1) Relation to other countries
- (2) Neighboring bodies of water
- (3) Peninsula of Jutland
- (4) Islands
- (5) Size

II. Physical Features

- (1) Baltic plain
 - (a) A sandy, wind-built country
- (2) Fiords
- (3) Heights of land
- (4) Denmark's only river
- (5) Forest area
- (6) Climate

III. The People

- (1) Physical and mental characteristics
- (2) Language
- (3) Literature
- (4) Art
- (5) Religion
- (6) Education

IV. Industries

- (1) Predominance of agriculture

- (a) Products
- (b) Cooperative methods
- (2) Manufacturing
- (3) Fishing

V. Transportation and Commerce

- (1) Railways and navigable waterways
- (2) Coastwise trade
- (3) Articles of export and import

VI. Government and Colonies

- (1) Constitutional monarchy
- (2) The legislative branch
- (3) Local government
- (4) Important colonial possessions
 - (a) Iceland
 - (b) Greenland

VII. History

- (1) The Viking era
- (2) Canute the Great
- (3) The Union of Kalmar
- (4) Medieval struggles
- (5) Early modern period
- (6) Napoleonic era
- (7) Recent prosperity

Questions

- Who is the present ruler of the country?
- What part has the wind had in the building of Denmark?
- What is the railway mileage of each hundred square miles of area? For each thousand inhabitants?
- What has been the attitude in Denmark toward woman suffrage?
- What did the activities of the country during the Napoleonic wars cost it?
- What has Denmark long possessed which the United States desired?
- How many metals are produced on the peninsula and islands?
- Which city of Denmark figured in one of the most famous literary works ever produced?
- What relation does the country bear to the largest island in the world?
- Why have manufactures developed so slowly? How are some of them still carried on?
- What world-famous sculptor has the country produced?
- When, besides in the Viking era, was Denmark a "mistress of the seas"?
- Trace the activities of the Northmen
- What principle have Danish farmers introduced which has made possible remarkable agricultural development?
- What famous writer made the world familiar with many picturesque phases of Danish life?
- Who was Denmark's great queen, and what did she accomplish?

Throughout the World War, Denmark maintained neutrality, and made a valiant effort to mitigate the economic difficulties of its people. The economic crisis which followed the war was the better adjusted because of the country's smooth-working coöperative organizations. P.O.T.

Related Subjects. The following articles in these volumes will add to the general information on Denmark given above. For map, see SWEDEN.

CITIES

Copenhagen
Canute
Christian
Cimbri
Frederick VIII

HISTORY

Hamlet
Northmen
Schleswig-Holstein

ISLANDS

Faroe
Greenland
Iceland

PRODUCTS AND INDUSTRIES

Agriculture
Butter
Dairying
Egg
Wheat

UNCLASSIFIED

Andersen, Hans
Christian
Angles
Brandes, Georg
Cimbri
Cooperation
Fiord
Jutes
Northmen
Saxons
Thorwaldsen, Bertel

DENOMINATE NUMBERS. There are standard units of measure used in industrial, commercial, and scientific life. These units are tabulated in groups which are called the *tables of denominate numbers*.

Any number of the units of measure is called a *denominate number*; for example, 7 feet, 4 dollars, 17 gallons. A denominate number which is expressed in terms of two or more units of the same kind is called a compound denominate number; as, 3 pounds, 5 ounces; 4 feet, 6 inches.

Tables of Money. The following tables show the values of various important money units:

Table of United States Money

10 mills = 1 cent (ct.)
10 cents = 1 dime (d.)
10 dimes = 1 dollar (\$)
10 dollars = 1 eagle

The dollar is the standard of value in the United States, and is divided into tenths (dimes), hundredths (cents), thousandths (mills).

Table of English Money

4 farthings = 1 penny (d.)
12 pence = 1 shilling (s.)
20 shillings = 1 pound (£)
21 shillings = 1 guinea

The old English penny corresponded to a coin used on the European continent, called *denarius*, hence the abbreviation "d" for penny. The penny equals about two cents. The pound sterling was, in the seventh century, a pound Troy in silver, hence its name. To-day its weight would be about one-third of its old weight, but there is no such coin now.

Table of Equivalent Values

COUNTRY	STANDARD	EQUIVALENT IN U. S. MONEY
United States	Dollar	\$1
Great Britain	Pound (Sterling)	4.8665
France	Franc	0.193*
Germany	Mark	0.238
Austria	Schilling	0.1407
Italy	Lira	0.0520
Greece	Drachma	0.13
Spain	Peseta	0.103*
Russia	Ruble	0.514

We think ordinarily of a pound (£) as about \$5; a franc, a lira, a drachma, a peseta, as about \$.20; a mark, a shilling, as about \$.25.

* Par value as before the World War. The French franc was stabilized in 1928 at 39 cents

1 franc = 100 centimes (c.)
1 mark = 100 pfennigs (pfs)
1 ruble = 100 copecs (c.)
1 lira = 100 centesimi

Tables of Length, Surface, and Volume. Below are several important tables giving values of units used in measuring distances, surfaces, etc. In measuring distance or length, the standard unit in the United States is the yard, and the table is called the *Table of Linear Measure*:

12	inches (in.)	= 1 foot (ft.)
3	feet	= 1 yard (yd.)
5½	yards	= 1 rod (rd.)
16½	feet	= 1 rod
320	rods	= 1 mile (mi.)
5280	feet	= 1 mile

The student taking up this subject should do much measuring inside and out-of-doors, getting real knowledge of the measures, not mere words. The home can be of much help to the school here because of the freedom possible in the house, yard, farm, etc. The school should ask for returns from measurements made at home.

From the linear table follows the table of square or surface measure; this is derived by building a square in each linear unit from inch through to rod.

Table of Common Surface Measure

144	square inches	= 1 square foot (sq. ft.)
	(sq. in.)	
9	square feet	= 1 square yard (sq. yd.)
30½	square yards	= 1 square rod (sq. rd.)
160	square rods	= 1 acre (A.)
640	acres	= 1 square mile (sq. mi.)

The illustration at the right (Fig. 1) represents a square built on an inch; that is, one square inch. It is clear that a square built on ½ inch is ¼ of a square inch.

The following (Fig. 2) represents a square built on a foot, divided

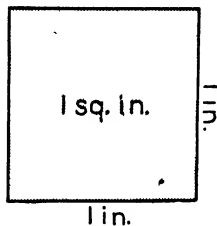


FIG. 1

into inches; that is, a square foot divided into square inches.

Fig. 3 represents a square built on one yard; that is, a square yard, or nine square feet.

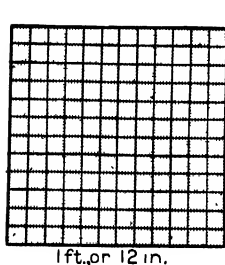


FIG. 2

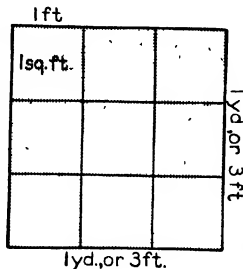


FIG. 3

Table of Surveyor's Linear Measure

7.92 inches = 1 link (li)
100 links = 1 chain (ch)
80 chains = 1 mile (mi)

Surveyor's Surface Measure

625 square links (sq li) = 1 square rod (sq rd)
16 square rods = 1 square chain (sq ch)
10 square chains = 1 acre (A)
640 acres (a section) = 1 square mile (sq mi)
36 square miles = 1 township (Tp)

The acre is not a square unit of measure, as

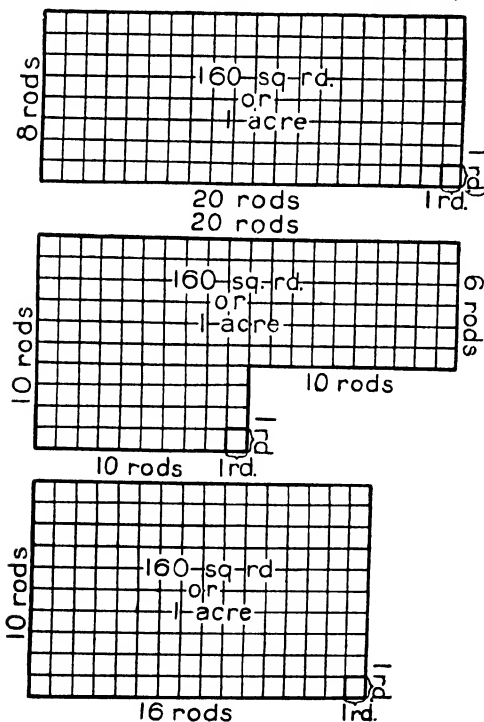


FIG. 4

are the square inch, square foot, and so on; the name *acre* has been applied to a definite

amount of ground, namely, 160 square rods, regardless of the shape of the piece of ground. An acre may be 16 rods long and 10 rods wide, or 8 rods by 20 rods, etc., as shown in preceding column (Fig. 4).

Notice that there is no linear measure corresponding to acre.

Table of Cubic Measure

1728 cubic inches (cu in) = 1 cubic foot (cu. ft)
27 cubic feet = 1 cubic yard (cu. yd.)

How many cubic-inch blocks can be laid on one square foot of a surface? (See Fig. 5.) Count and see. The number is 144. How many layers, each containing 144 cubic-inch blocks, can be piled up in a pile 12 inches high? How many cubic inches in a cubic foot?

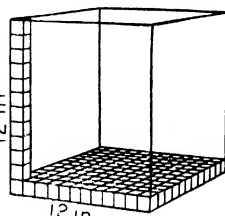


FIG. 5

Examine Fig 6. How many cubic-foot blocks in the first layer? How many layers in the cubic yard? How many cubic feet in a cubic yard?

Cubic Measures Used in Industries

1 cubic yard = 1 load
128 cubic feet = 1 cord
24½ cubic feet = 1 perch

One load is the unit of measure for earth removed in excavating. One cord is the unit used in measuring firewood; a pile of this wood 8 feet by 4 feet by 4 feet is called a *cord*.

One cord foot is a pile 1 foot by 4 feet by 4 feet. One perch is the unit used in measuring stone; it is 1 foot by 1½ feet by 16½ feet, or contains 24½ cubic feet.

Board Measure. One board foot is generally the unit of measure for lumber, boards, timbers, joists, etc. The board foot is 1 foot long, 1 foot wide, and 1 inch thick (see Fig. 7).

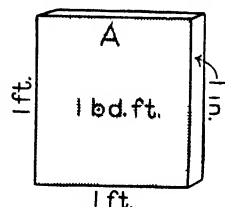


FIG. 7

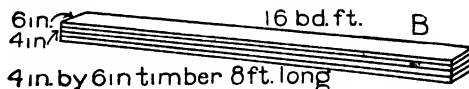


FIG. 8

When lumber is less than one inch thick, it is counted as one inch thick. If it is over one inch thick, the thickness is considered.

The above timber (Fig. 8) contains 4 layers each 1 inch thick, with a surface 8 feet by 6

inches. Each layer contains 4 board feet; the timber contains 16 board feet.

A timber is 18 feet long, 8 inches wide, and 6 inches thick. How many board feet in it?

Number of board feet =

$$\frac{(18 \times 12) \times 8 \times 6}{12} = 72 \text{ or } 18 \times \frac{8}{3} \times 6 = 72.$$

Table of Liquid Measure

4	gills (gi.)	= 1 pint (pt.)
2	pints	= 1 quart (qt.)
4	quarts	= 1 gallon (gal.)
31½	gallons	= 1 barrel (bbl.)

One liquid gallon occupies 231 cubic inches. One cubic foot holds, roughly, 7½ gallons (Fig. 9).

Table of Dry Measure

2	pints	= 1 quart
8	quarts	= 1 peck
4	pecks	= 1 bushel

The standard of dry measure is the Winchester bushel, a cylinder 18½ inches in diameter and 8 inches deep, whose capacity is 2150.42 cubic inches. A bushel occupies, roughly, 1½ cubic feet. Fruits and vegetables are now bought and sold largely by weight, instead of dry measure.

Tables of Weight Measures. Below are given the tables in common use for the purpose of measuring weights.

Table of Troy Weight

24	grains (gr.)	= 1 pennyweight (pwt. or dwt.)
20	pennyweights	= 1 ounce (oz.)
12	ounces	= 1 pound (lb.)
1	pound Troy	= 5760 grains

Table of Avoirdupois Weight

16	ounces (oz.)	= 1 pound (lb.)
100	pounds	= 1 hundredweight (cwt.)
2000	pounds	= 1 ton (T.)
2240	pounds	= 1 long ton (L.T.)
1	pound avoirdupois	= 7000 grains

Table of Apothecaries' Weight

20	grains (gr.)	= 1 scruple (℥)
3	scruples	= 1 dram (ʒ)
8	drams	= 1 ounce (ʒ)
12	ounces	= 1 pound (lb.)

Troy weight is used for weighing gold, silver, platinum, jewels; avoirdupois is used to weigh provisions, as meat, sugar, and flour; farm products, as hay, butter, sugar beets, etc.; coal and iron and other commodities. Its name *avoirdupois* (*to have weight*) signifies its use in weighing bulky articles.

The apothecaries' table is used by the physician and the druggist. The grain is the unit of comparison among the three tables, being

the same in all, while the avoirdupois pound (7,000 grains) differs from the Troy and the apothecaries' pound, each of which is 5,760 grains. The grain which was taken as the unit of the English system of weights was the average of grains "taken from the middle of the ear of wheat and well-dried." The Troy pound is the standard weight in the United States.

Other Tables. The following tables contain several interesting and important units that are made use of every day:

Table for Measuring Paper

24	sheets = 1 quire	2	reams = 1 bundle
20	quires = 1 ream	5	bundles = 1 bale
(Five hundred sheets are now commonly called a ream.)			

Table for Counting

12	things = 1 dozen (doz.)
12	dozen = 1 gross
12	gross = 1 great gross
20	things = 1 score

Table for Time Measure

60	seconds (sec.)	= 1 minute (min.)
60	minutes	= 1 hour (hr.)
24	hours	= 1 day (da.)
7	days	= 1 week (wk.)
30	days	= 1 calendar month (mo.)
12	calendar months	= 1 calendar year (yr.)
365	days	= 1 common year
366	days	= 1 leap year
100	years	= 1 century

A mean solar day is the standard unit for measuring time; it is the interval of time from noon of one day to noon of the next, at a given place, *noon* meaning the moment of the sun's crossing the meridian of that place. The mean solar year is 365 days, 5 hours, 48 minutes, 46 seconds, or nearly 365¼ days. The common year contains 365 days; leap year, 366 days. This is explained fully in the article **CALENDAR**.

Angular Measurement. In the measurement of angles, the most important unit employed is the degree.

In Fig. 10 the line OA is perpendicular to the line CB, and the angle AOB is a right angle. This angle is measured by the arc AB, or one-fourth of a circumference, and since every circumference is divided into 360 degrees (360°), it is an angle of 90°. Any angle less than a right angle is measured by less than one-fourth of a circumference, and so is less than 90°. Any angle greater than a right angle is measured by more than

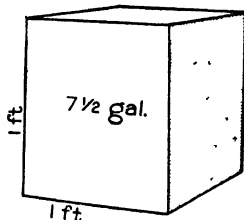


FIG 9

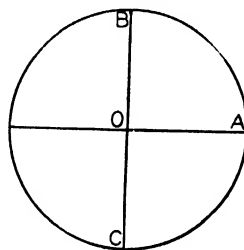


FIG. 10

one-fourth of a circumference and is more than 90° , as seen below (Fig. 11).

Table of Angular Measure

60 seconds (")	= 1 minute (')
60 minutes	= 1 degree ($^\circ$)
360 degrees	= 4 right angles

Reduction of Denominate Numbers. The process of reducing denominate numbers to lower denominations or units is called *reduction descending*; as, 6 feet = 72 inches. The process of reducing them to higher denominations or units is called *reduction ascending*; as, 16 pints = 8 quarts. The latter reduction is used the more often.

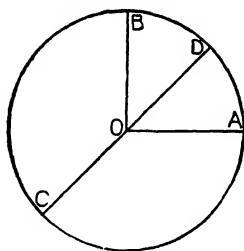


FIG. 11

The angle AOD is an angle of 45° , and AOC is an angle of 135° .

Reducing to a lower unit. (1) Express 16 ft. in inches:

$$\text{Number of inches} = 16 \times 12 = 192.$$

or

$$16 \text{ ft.} = 16 \times 12 \text{ in.} = 192 \text{ in.}$$

(2) Change 9 ft. 8 in. to inches.

$$\text{Number of inches} = (9 \times 12) + 8 = 116.$$

(3) Express in ounces avoirdupois: 7 lb. 8 oz.

$$\text{Number of ounces} = (7 \times 16) + 8 = 120$$

(4) Express as square inches: 9 sq. ft. 123 sq. in.

$$\text{Number sq. in.} = (9 \times 144) + 123 = 1419$$

or

$$9 \text{ sq. ft.} + 123 \text{ sq. in.} = (9 \times 144) \text{ sq. in.} + 123 \text{ sq. in.} \\ \text{or } 1419 \text{ sq. in.}$$

The work is done, without names, thus:

$$\begin{array}{r} 144 \\ \times 9 \\ \hline 1296 \\ + 123 \\ \hline 1419 \end{array}$$

The most desirable form for such problems is that in which the words are at the left-hand side of the equality sign and no words are attached to numbers, as:

$$\text{Number of sq. in.} = (9 \times 144) + 123 = 1419.$$

(5) Express as seconds: 3 da. 7 hr. 50 min. 8 sec.

$$\text{Number hr.} = (3 \times 24) + 7 = 79.$$

$$\text{Number min.} = (79 \times 60) + 50 = 4790.$$

$$\text{Number sec.} = (4790 \times 60) + 8 = 287408.$$

The work done without names is as follows:

$\begin{array}{r} 24 \\ \times 3 \\ \hline 72 \\ + 7 \\ \hline 79 \end{array}$	$\begin{array}{r} 79 \\ \times 60 \\ \hline 4740 \\ + 50 \\ \hline 4790 \end{array}$	$\begin{array}{r} 4790 \\ \times 60 \\ \hline 287400 \\ + 8 \\ \hline 287408 \end{array}$
--	--	---

Reducing to higher units. (1) Change to feet (a) 216 in.; (b) 7 ft. 9 in.

$$(a.) \text{ Number ft.} = \frac{216}{12} = 18.$$

$$(b.) \text{ Number ft.} = 7\frac{9}{12} = 7\frac{3}{4}.$$

(2) Change to pounds avoirdupois (a) 432 oz.; (b) 7 lb. 15 oz.

$$(a.) \text{ Number lb.} = \frac{432}{16} = 27.$$

$$(b.) \text{ Number lb.} = 7\frac{15}{16}$$

(3) Change to higher units 5963 pints.

$$\text{Number qt.} = \frac{5963}{2} = 2981, \text{ and } 1 \text{ pt.}$$

$$\text{Number pk.} = \frac{2981}{8} = 372, \text{ and } 5 \text{ qt.}$$

$$\text{Number bu.} = \frac{372}{4} = 93.$$

$$5963 \text{ pt.} = 93 \text{ bu. } 5 \text{ qt. } 1 \text{ pt.}$$

It may be done in this concise form:

$$\begin{array}{r} 2 \overline{)5963} \\ \underline{8 \overline{)2981}} + \text{remainder } 1 \\ \underline{4 \overline{)372}} + \text{remainder } 5 \\ \underline{93} \\ 5963 \text{ pt.} = 93 \text{ bu. } 5 \text{ qt. } 1 \text{ pt.} \end{array}$$

(4) Change 56 cwt. to T.

$$\text{Number T} = \frac{56 \times 100}{2000} = 2\frac{1}{2}$$

(5) Express in bu.: 3 pk. 5 qt. 1 pt.

$$\text{Number qt.} = 5\frac{1}{2}$$

$$\text{Number pk.} = 3\frac{5\frac{1}{2}}{8} = 3\frac{11}{16}$$

$$\text{Number bu.} = \frac{3\frac{11}{16}}{4} = \frac{59}{64}$$

Note—1 pt. = $\frac{1}{2}$ qt., so there are $5\frac{1}{2}$ qt.; it requires 8 qt. to make a pk; $5\frac{1}{2}$ qt. = $\frac{5\frac{1}{2}}{8}$ of a pk; multiply numerator and denominator of the complex fraction by 2, thus; $\frac{5\frac{1}{2} \times 2}{8 \times 2} = \frac{11}{16}$. There are 3 pk. and $\frac{11}{16}$ pk. or $3\frac{11}{16}$ pk., which is $\frac{3\frac{11}{16}}{4}$ of a bu. Reduce fraction by multiplying both terms by 16, thus; $\frac{3\frac{11}{16} \times 16}{4 \times 16} = \frac{59}{64}$.

Addition and Subtraction of Compound Denominate Numbers. In the following paragraphs, the principles underlying the addition and subtraction of denominate numbers are explained. *Addition:*

Add:
$$\begin{array}{r} 8 \text{ gal } 3 \text{ qt } 1 \text{ pt.} \\ 1 \text{ gal. } 2 \text{ qt. } 3 \text{ pt.} \\ \hline \text{Sum: } 9 \text{ gal. } 5 \text{ qt. } 4 \text{ pt.} \\ \text{Reduced sum: } 10 \text{ gal. } 3 \text{ qt } 0 \text{ pt.} \end{array}$$

Add at first; then reduce:

$4 \text{ pt} = 2 \text{ qt}$
 $(5+2) \text{ qt} = 7 \text{ qt} = 1 \text{ gal } 3 \text{ qt.}$
 $9 \text{ gal} + 1 \text{ gal} = 10 \text{ gal.}$

Reduce as you add, as below:

sq yd.	sq ft	sq in
6	4	20
2	8	200
9	4	70

Note—Out of 220 sq in we get 1 sq ft (which is 144 sq in), and have left 70 sq in, $(4+8+1) \text{ sq. ft.} = 13 \text{ sq ft}$; out of 13 sq ft we get 1 sq yd (which is 9 sq. ft.) and have left 4 sq ft, $(6+2+1) \text{ sq yd} = 9 \text{ sq yd}$

Add:

	mo.	da.	hr	min.
	4	12	18	40
	3	15	12	50
	1	20	25	52
Sum:	8	47	55	142
Reduced sum:	9	19	9	22

(1) Add each set.

(2) Divide 142 by 60 (the number of minutes in an hour), which gives 2 and a remainder 22. This means that 142 minutes = 2 hours and 22 minutes.

(3) Add 2 to 55 and divide 57 by 24 (the number of hours in a day); this division shows there are 2 days and 9 hours in 57 hours.

(4) Add 2 to 47, and divide 49 by 30 (the number of days in 1 month); this division shows there are 1 month and 19 days in 49 days.

(5) Add 1 to 8.

We find the sum to be 9 months 19 days 9 hours 22 minutes. Reduce each set as we go along and get the final answer at once, as below:

gal.	qt.	pt	gi
4	3	1	3
1	2	1	2
2	1	1	1
9	0	0	2

Adding the gills we get 6 gills, which equals 1 pint 2 gills. Place 2 gills in gills' place, add 1 pint to the pints, and get 4 pints, which equal 2 quarts and no pints. Add the 2 quarts to the quarts and get 8 quarts, which equal 2 gallons. Add the 2 gallons to the gallons and have 9 gallons. The answer is 9 gallons 0 quarts 0 pints 2 gills.

Subtraction:

(1) A boy weighed on Monday 118 lb. and 7 oz.; on Thursday 116 lb. and 13 oz. What did he lose in the time?

lb	oz.	lb.	oz
118	7	= 117	(16+7) = 23
116	13	= 116	13
		1	10

Note—We cannot take 13 oz. from 7 oz., so we take 1 lb from 118 lb and add it (16 oz.) to 7 oz. and have 23 oz. Subtracting, we have 1 lb. 10 oz.

(2) From a piece of ground containing 78 acres and 90 sq. rd., a piece is sold containing 15 acres and 140 sq. rd. What is left?

acres	sq rd	acres	sq rd.
78	90	= 77	250 (160+90)
15	140	= 15	140
		62	110

(3) Subtract the following:

gal	qt	pt	gi
6	2	1	1
4	3	1	3
1	2	1	2

Note—Change 1 pt to 4 gi, then subtract 3 gi from 5 gi and have 2 gi left. Change 1 qt to 2 pt and subtract 1 pt, having 1 pt left, then change 1 gal to 4 qt and add that to 1 qt, from the sum take 3 qt, leaving 2 qt, finally take 4 gal from 5 gal. and have 1 gal left

Multiplication:

The average weight of the girls in a class of 25 is 86 lb. 9 oz. What do they all weigh?

lb	oz
86	9
	25

2150 lb 225 oz = 2164 lb 1 oz

Multiply 9 ounces by 25 and get 225 ounces, multiply 86 pounds by 25 and get 2150 pounds. Change 225 ounces to pounds by dividing 225 by 16 (the number of ounces in a pound). Find 225 ounces = 14 pounds and 1 ounce, and note that the answer becomes 2164 pounds and 1 ounce

Division:

yr	mo.	da
6 3	8	20
	7 mo	13½ da

Note—3 yr = 36 mo. 36 mo + 8 mo. = 44 mo. 44 ÷ 6 = 7 and a remainder of 2. 2 mo = 60 da. 60 da + 20 da. = 80 da. 80 ÷ 6 = 13½. The answer is 7 mo. and 13½ da

lb	oz	lb.	oz (avoirdupois)
240	12 ÷ 26		12

This division we may carry out in three ways, as follows:

(a) Reduce dividend and divisor to ounces, and divide, as follows:

lb.	oz.	lb.	oz.
240	12 ÷ 26		12 =
	oz.	oz.	
	3852 ÷ 428 = 9		

(b) Reduce both terms to pounds and divide, as follows:

$$\begin{array}{rclcl} \text{lb.} & \text{oz.} & \text{lb.} & \text{oz.} & \\ 240 & 12 \div 26 & 12 = & & \\ \text{lb} & \text{lb.} & & & \\ 240\frac{3}{4} \div 26\frac{3}{4} = \frac{963}{4} \div \frac{107}{4} = 9 \end{array}$$

(c) Divide as the problem reads, as follows:

$$\begin{array}{r|l} \text{lb.} & \text{oz.} \\ 26 & 12 \\ \hline & 240 \\ & 12 \end{array}$$

$9 \times 12 \text{ oz} = 108 \text{ oz}$, which equal 6 lb. and 12 oz.
 $9 \times 26 \text{ lb} = 234 \text{ lb}$
 $234 \text{ lb} + 6 \text{ lb} = 240 \text{ lb}$.

J.W.Y.

DENSITY. A bottle cork and a glass stopper of exactly the same size will vary in weight. This familiar fact, illustrated countless times in our contact with material substances, leads us to the definition of density: The density of any substance is the relation of its mass (measured by weight) to its volume (bulk or size). The glass stopper has greater density than the cork, because it has a greater number of units of mass per unit of volume. A building brick has greater density than a block of wood of equal size, for the same reason. In estimating the density of a body or substance, we divide its mass by its volume and express the result in units of weight. In the English system, we say the density is pounds per cubic foot; in the metric, grams per cubic centimeter. The ratio of the density of a body to the density of water at 4° C. is the *specific gravity* of that body. See GRAVITY, SPECIFIC. A.L.F.

Problems. From the statement that the density of a body is found by dividing its mass or weight by its volume, we derive the formulas

$$D = \frac{W}{V} \text{ and } V = \frac{W}{D}.$$

1 A stone block measures 5 feet by 4 feet by 18 inches, and weighs 1,800 pounds. What is its density in pounds per cubic foot?

SOLUTION

$V = (5 \times 4 \times 1\frac{1}{2})$ cubic feet = 30 cubic feet.

$$D = \frac{1,800}{30} = 60, \text{ number of pounds per cubic foot.}$$

2 The density of a certain lot of concrete is 150 pounds per cubic foot. What is the weight of a concrete pier containing 2,400 cubic feet of material?

SOLUTION

$$D \text{ (or } 150) = \frac{W}{V \text{ (or } 2,400)} \quad W = 150 \times 2,400 = 360,000, \text{ number of pounds.}$$

3. The density of water is about 62.4 pounds per cubic foot. What is the weight of the water in a cylindrical tank whose dimensions are: height, 75 feet; diameter, 10 feet?

SOLUTION

The volume of the cylinder is $3.1416 (\pi) \times \text{radius}^2 \times \text{altitude}$ (see CYLINDER). That is, $V = 3.1416 \times 5^2$

$\times 75$. D being known, calculate W from the formula stated above.

DENT, JULIA. See GRANT, U. S.

DENTAL SCHOOLS. See DENTISTRY.

DENTINE, den' tin. See TEETH.

DENTISTRY, den' tis tree. The progress made in methods and practice of dentistry has been most marked since 1910. This was due in part to the introduction of the X-ray about this time, and of the idea that diseased teeth may be the cause of chronic diseases in other parts of the body, such as rheumatism. Specialization in the practice of dentistry since that time has become increasingly more common, and many dentists now limit their practice to distinct parts of the field, such as oral surgery; orthodontics, or the regulating and straightening of teeth; prosthetics, or the making of plates and partial plates, and children's dentistry.

Surgical Dentistry. This branch consists in diagnosing the symptoms shown by the patient's mouth and teeth and in giving required treatment. In your grandfather's time, a dentist was a man who merely extracted teeth. That conception has been entirely altered, and extraction is now resorted to only in cases of absolute necessity, as, for instance, when teeth have been so neglected that treatment would be of no benefit, or where it is thought the affected teeth are likely to cause disease elsewhere in the body. Modern dentistry demands the saving treatment of teeth.

If a tooth aches, it is not necessarily an indication that it must be taken out. Careful treatment may relieve the ache caused by the cavity in the tooth, and the cavity may be filled. If the decay has exposed the nerve or the pulp of the tooth, the nerve can be removed and the root canal filled, making it possible to fill the cavity later. Before this form of treatment is undertaken, X-ray pictures of the tooth and its socket are made, and it is customary to treat only such teeth in this way as have little or no changes in the region about the apex of the tooth. Scaling, or the careful removal of tartar accumulated around the base or neck of the tooth, is another important form of treatment which adds to the life of teeth by preventing or hindering the development of pyorrhea.

Oral Surgery. A phase of practice which corrects or treats injuries, deformities, or diseases of the oral cavity by surgical methods is known as *oral surgery*. This specialty had been developed before 1900, but not until the World War was it widely recognized and generally appreciated, because of the services rendered by the oral surgeons in treating the common mutilating injuries of the mouth and jaws, in which practice among the wounded they gained invaluable experience.

Painless Dentistry and Surgery. Modern progress in both dentistry and oral surgery would have been impossible without the help of anesthesia; indeed, the terror of the dentist's chair is fast disappearing, because of the common use of methods which are painless, or nearly so. One common anesthetic agent used by dentists is nitrous oxide, commonly called laughing gas. This gas and oxygen, supplied highly compressed in steel tanks or drums, are mixed in any desired proportion, warmed and fed to the patient by a cleverly designed machine through a rubber face or nose mask. Since the patient loses consciousness in this method of anesthesia, and the sense of pain is lost all over the body, this is called general anesthesia. It is often used for the extraction of teeth, as well as for other operations usually of short duration in and about the mouth. Other gases may be used in the place of nitrous oxide, as for example, ethylene, which may be used with a higher proportion of oxygen, but which, unfortunately, is inflammable.

At the present time, local anesthesia has become much more common for the purpose of controlling pain in the practice of dentistry and mouth surgery. Certain drugs, when injected into the tissues or into nerve trunks, destroy sensation temporarily in rather sharply localized regions. If the injection is made at the site of operation, and the anesthetic drug is distributed around the nerve endings in this region, the process is called *infiltration anesthesia*. If a nerve trunk at some distance from the field of operation is injected with the drug, it will not transmit sensation for some time, and if the proper trunk or trunks are selected, sensation and pain in a given region are abolished for an hour or longer. This method is called *conductive anesthesia*, or nerve block, and is especially valuable in delicate and tedious operations, as in the extraction of an impacted wisdom tooth or of many teeth from the same side of the lower jaw.

Prosthetics. This includes the branch which deals with making and inserting artificial teeth in place of natural teeth that have been extracted. Dental work of this character requires mechanical skill and careful observation of any peculiarities of the mouth and lower part of the face, not only in order that the artificial teeth supplied may be like the natural teeth in color, size, and form, but also to remedy deformities due either to the loss of teeth or to other causes. Artificial teeth are made of porcelain, and may be affixed to plates of vulcanized rubber or of gold or platinum shaped to fit snugly over the gums. Very recently, substances like bakelite have been used for plate bases. When only a few teeth have been lost, instead of constructing a plate, as was formerly the custom, clever contrivances called bridges are now often used

to replace the lost teeth. The artificial teeth are fixed by bands, clasps, or crowns to the natural teeth in the mouth, and suspended, bridgelike, across the space formerly occupied by the extracted teeth.

Mechanical Dentistry. Many dentists have complete laboratories in which they do all the technical work connected with the actual construction of plates, bridges, and appliances. Others secure casts and models of the mouth and the teeth of the patient for whom restorations are to be made; such models and a plan for the appliance are sent to outside laboratories, where the work is done. Although these laboratories may be supervised by a graduate dentist, most of the actual labor in the construction of plates and appliances is performed by specially trained technicians known as dental mechanics. They often receive their training in trade schools of mechanical dentistry, although proficiency may be acquired by the method of apprenticeship, as is common in other trades.

Orthodontics. If teeth are overcrowded, irregularly arranged in the arch, or if the chewing surfaces do not meet as they should, the dental surgeon will attempt to overcome these defects by changing very slowly the position of the teeth or the form of the arches. The art of correcting the malposition of teeth has developed into a distinct specialty in dentistry, known as *orthodontics*, or *orthodontia*.

Preventive Dentistry and Children's Dentistry. Up to the last few years, the practice of dentistry has largely been corrective in its aim. A new field has been opened up in preventive work which is receiving increasing attention. If dental decay, mouth deformities, and gum diseases can be prevented or reduced in amount, the necessity for corrective work can be correspondingly decreased. Indeed, this is the controlling spirit of modern methods in medicine and dentistry. Caries, or decay of the teeth, is caused by germs or organisms that live and reproduce their kind in the grooves, pits, and unclean regions of the teeth. These germs ferment food remnants in these regions, and thereby produce acids which dissolve the lime salts out of the enamel and dentine, the ivorylike substance of the body and root of the tooth, beneath the enamel. It is believed that caries can be materially decreased by properly cleaning the teeth and controlling the diet.

Moreover, the mouth being a common portal of entry and breeding place for germs and organisms that infect the body, mouth and teeth conditions may be responsible for derangements of health in other and remote parts of the body. All of these notions have emphasized the importance of proper attention to children's mouths and teeth. Even though the milk, or temporary, teeth are soon replaced with the permanent teeth, disease or

decay of the temporary teeth is quite as serious a matter as defects of the same kind in the permanent teeth. The most effective time to practice preventive dentistry is during the period of the formation and eruption of both the temporary and the permanent teeth, especially the latter. On this account, and because in many instances it has been shown that slow progress in school is due to bad teeth, this preventive work has been carried on in connection with the schools. In some cities, dentists are paid from the city funds, and are thus enabled to devote a large part of their time to correcting the defects in children's teeth, and to instructing them how to care for their teeth. In other places, only examinations are made, and the parents advised of the need for treatment where defects are found. The theory that many a case of dullness in school is directly or indirectly due to bad teeth was scoffed at but a few years ago, but now it is commonly acknowledged. In many schools, the dentists are assisted by properly trained women called dental nurses, or dental hygienists. This oral hygiene movement in schools, both prophylactic and corrective, has shown the importance of proper dentistry by increasing physical and mental efficiency as well as by decreasing the incidence of contagious diseases.

Antiquity and History. In a museum in Italy may be seen splints and bands of gold of Etruscan origin, used to hold loose teeth in place or to retain one or more artificial teeth. It has often been said that the ancient Egyptians filled the cavities formed by decay in

teeth with gold, although this has never been proved. Although it is not actually known to what extent technical dentistry was practiced in the earlier civilizations, knowledge of the art was lost, and only revived within comparatively recent times. Extraction of teeth, however, was practiced even by very primitive peoples by equally primitive methods, such as are preserved and practiced in our day among the Southern mountain white people. The practice is to "jump" or knock out teeth with a hammer and a wrought-iron nail. Tooth extraction by barbers was common for centuries (see BARBER). Later, dental work was recognized as a phase of medical science, and was practiced by that profession; in some countries even to-day, dentists must be graduates of medical schools. Only in the past century did dentistry develop as a distinct profession.

Dental Schools. For the purpose of giving instruction in dentistry, schools have been established in many large cities of the world. The first of these schools in America was founded in Baltimore in 1830. A few years later, the Ohio College of Dental Surgery was established. Nearly all universities in the United States and Canada now have dental schools, and they confer degrees on graduates. A number give courses for dental hygienists. The usual course of study embraces four years, during the last two years of which practical experience is gained. A high-school course and one or two years of college (in rare instances a college diploma) are required for admission to a dental school. See TEETH. E.H.H.



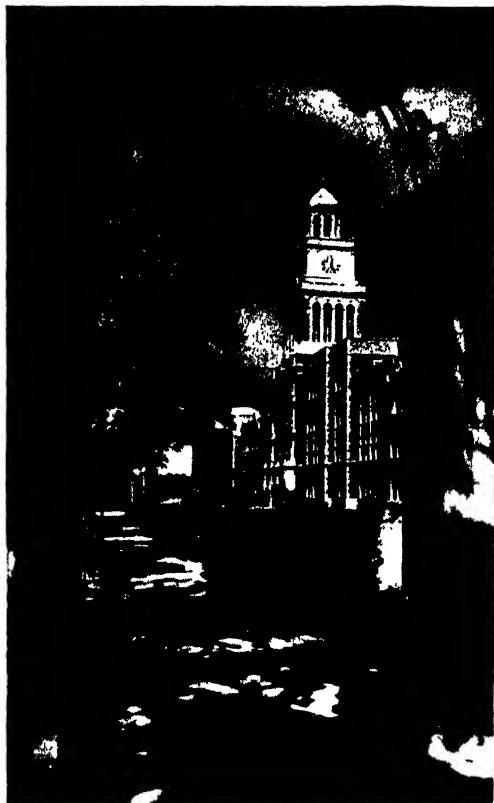
DENVER, COLO. From a rough mining town founded in 1858, the capital of Colorado has developed into the largest city west of the Missouri River and east of the valley cities of the Pacific coast. Its location on a plain one mile above the sea, with mountain scenery of unparalleled grandeur at its door, and its clear skies and mild but bracing climate, have made Denver a popular tourist and health resort, but it has the added advantage of being a prosperous industrial and trading center.

Denver is the county seat of Denver County, with which it is coextensive. Its area is eighty-nine square miles. The city is located at the junction of the South Platte River and Cherry Creek, on a site which is north and east of the

center of the state. New York is 2,025 miles east; San Francisco is 1,374 miles west; and Chicago is 1,050 miles east. Population, 1928, 294,200 (Federal estimate).

General Description. Situated only fifteen miles from the foothills of the mountains, this mile-high capital is the gateway to twelve national parks and thirty-two national monuments. On a clear day, the lofty summits of the Snowy Range—those majestic sentinels of the Colorado Rockies—are visible in the distance, from Long's Peak on the north to Pike's Peak on the south.

The countless visitors who are drawn to Colorado every year by its scenic attractions find Denver a well-kept city of modern ap-



Scenes of Beauty. The East Denver High School. Electric fountain in the Denver City Park. Below, a view from the steps of the state Capitol, across the lawns of the Civic Center, toward the snow-capped Rocky Mountains.



NIGHT VIEW OF THE STATE CAPITOL

pearance. Fire hazards in so dry a climate have led to the use of brick and stone for building purposes; the streets are wide and well-paved, and the extensive use of irrigation gives the lawns and parked areas a green coloring that is all the more vivid against its backgrounds.

Conspicuous in the heart of the city is the state Capitol, a handsome edifice of Colorado gray granite, surmounted by a gold-covered dome 272 feet above the ground. To the right and left of the Capitol grounds are the sites of two imposing state buildings—the state museum and the state office building—the whole forming a fine quadrangle. Broadway, the principal north-and-south thoroughfare, separates the Capitol grounds from the Civic Center on the west, the outstanding features of which are an outdoor Greek theater and the Voorhies Memorial Gate. West of the Civic Center, but virtually a part of it, is the stately main building of the public library, with a façade in Corinthian style. One block westward, the United States mint completes this impressive downtown group of public buildings.

Parks. Not only is the city the gateway to a dozen national parks, but it has also acquired a municipally owned system of forty-five mountain parks, covering over 10,350 acres and including seventy-five miles of mountain boulevards. Ovens, shelter houses, and other facilities for camping are provided for the convenience of motorists and picnickers. Within the city

limits there are thirty-nine parked areas, including seventeen playgrounds for children. The largest, known as City Park, has, among other features, two artificial lakes, an electric fountain, and a zoölogical garden containing a variety of Western animals. Among others are Washington Park, noted for its fine landscaping; Cheesman, containing a memorial that commands mountain views over a range of 150 miles; and Elitch's Gardens, widely known as the site of a stock-company theater.

Education and Institutions. Denver is the seat of Denver University, under Methodist control (see COLORADO). It has also the Jesuit College of the Sacred Heart, Westminster Law School, Denver Bible Institute, Colorado Woman's College, Loretto Heights Academy, the College of Music, and a number of other private schools and schools of music, art, and dramatics. The libraries of the city include the fine public library, with eight branch organizations, the state library, supreme court library, and those owned by the various schools.

The white marble state museum, opposite the Capitol on the south, is a fine example of Ionic architecture, and houses several remarkable collections of prehistoric and early Colorado life, including those of the Chff Dwellers and Indians. Other valuable collections are those on natural history, in the Colorado Museum in the City Park.

Commerce and Industry. Because it has no competitor nearer than 400 miles, Denver has become the logical jobbing, shipping, and manufacturing center of the Rocky Mountain section. In addition, it has the advantages of a downhill haul to Eastern points, nearness to the geographical center of the United States, and accessibility to the Pacific coast, with its



Photos Denver Tourist Bureau

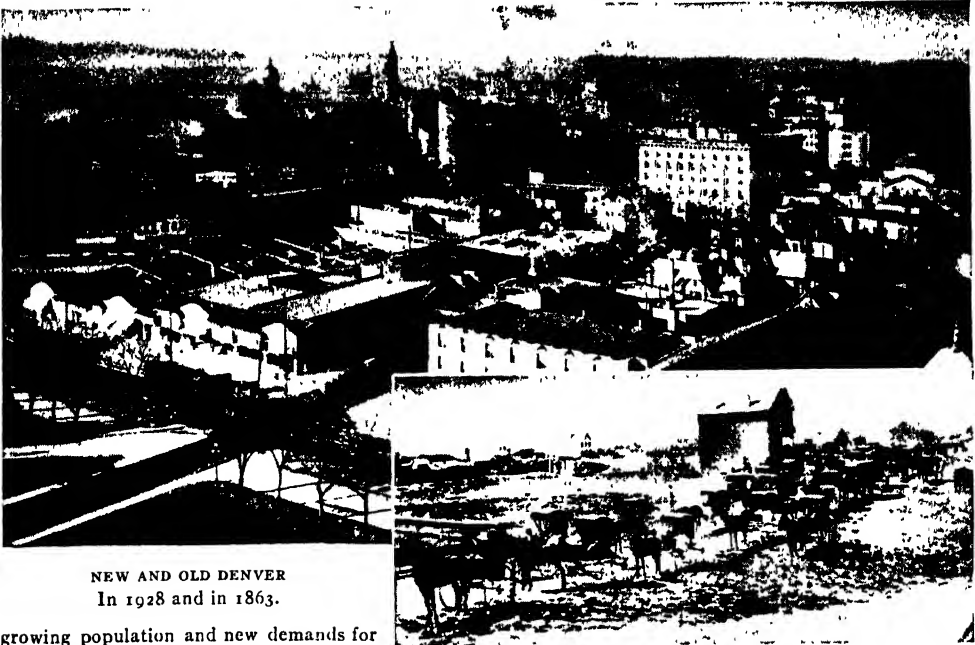
Not Far from Denver. Part of a sixty-mile scenic automobile road leading to the capital city. Below is
1908 Estes Park village, at the eastern entrance to Rocky Mountains National Park.



Photo. Denver Tourist Bureau

"What Is Man, That Thou Art Mindful of Him?" One stands in awe before towering Long's Peak, on the edge of Denver-land.

1909



NEW AND OLD DENVER
In 1928 and in 1863.

growing population and new demands for products. As a railroad center, it has much the same prestige in its territory as Chicago has in the Middle West, and is served by the Chicago, Burlington & Quincy, Atchison, Topeka & Santa Fé; the Chicago, Rock Island & Pacific; the Colorado & Southern; the Denver & Rio Grande Western, the Union Pacific; the Missouri Pacific; and the Denver & Salt Lake railroads. See **MOFFAT TUNNEL**.

In the Denver zone, there are rich deposits of coal, gold, silver, lead, copper, and zinc, and wide areas devoted to sheep and cattle ranches. These resources have stimulated and helped to shape the industrial life of the city. The leading industry is the smelting and refining of lead, but the extraction and preparation of copper, iron, gold, silver, radium, and other metals are also important. Denver is a leading center, too, in the manufacture of mining machinery. The city is one of the largest feeder-sheep markets in the world, and usually ranks fourth as a feeder-cattle market. Its slaughtering and meat-packing plants vie with those of Chicago, and it is the headquarters of the Western Livestock Association. For the annual livestock show, which is next to that of Chicago in size, a steel and concrete stadium has been built at a cost of \$250,000. Other prosperous enterprises include flour and grist mills, sugar-beet factories, foundries and machine shops, and plants for the repair and construction of railroad equipment.

History. Denver was settled by miners in 1858, and was named in honor of General J. W. Denver, governor of Kansas Territory, of which Colorado was then a part. The city was incorporated in the following year by a provisional legislature, and was reincorporated by the first territorial legislature of Colorado in 1861. It became the capital of the territory in 1867, and remained the seat of government of Colorado when that commonwealth was

admitted into the Union as a state, in 1876. Contributing to Denver's prosperity has been the establishment there of the administrative headquarters of oil-producers and refiners, of various mining companies, and of many branches of the Federal government. W.E.B.

DENVER, UNIVERSITY OF. See **COLORADO (Education)**.

DEODORANT, de o' dur ant. See **DISINFECTANTS**.

DEPARTMENT, one of the chief territorial and administrative divisions of France, corresponding in some measure to a state of the American Union, or to a province of Canada. When the kingdom was divided into departments, at the time of the French Revolution, the division was determined by the number of people, amount of direct taxes, and extent of territory. This division was effected in 1789, the thirty-four provinces being replaced by eighty-three departments, which were subsequently increased by four, after the close of the Franco-German War in 1871.

Since 1881, the three departments of Algeria are also treated as a part of France proper, thus making a total of ninety departments. Each department is subdivided into *arrondissements*, or congressional departments, for political purposes; these into *cantons*, or electoral districts; and the cantons into *communes*, or the smallest administrative districts. A *prefect*, appointed by the central government, presides over each department.

DEPARTMENT STORE. Although of comparatively recent development, the modern de-



THE FIRST "DEPARTMENT STORE" IN AMERICA

Photo: Keystone

Such was the claim put forth in behalf of this building and its contents in 1680, but as a matter of fact, it was a large "general store," such as may be found in thousands of locations to-day. It probably was the first store of this type on American soil. The building still stands, on a Massachusetts highway, near Duxbury. The automobile and the gasoline station add a modern touch.

partment store has proved one of the greatest economic successes of the times. The creation of such stores was prompted by the unquestioned advantages a person could derive from being able to do all necessary purchasing under one roof, instead of being obliged to make a tour of a number of stores.

The modern department store is equipped to meet the needs not only of individuals but of entire families. Not only are necessities such as food provided, but dry goods, clothing, millinery, furniture, hardware, and a wide variety of other articles are all to be found, each in a special department which is in itself a complete store. It would be more difficult to mention an article in daily use that could not be obtained at a department store than to enumerate the vast number of things that are daily sold there.

The department store is generally supposed to be entirely an American development, but such is not the case. Its principles were adopted in London in 1863 by William Whiteley, who became known as the "Universal Provider." He added department after department to his original store, until his business grew into one of the largest in England. However, the department store has reached its highest stage of efficiency, in organization and in service, in the United States and Canada.

The opening of a store of this kind in one of the most fashionable streets of London in 1909 by a prominent Chicago business man was regarded as an event of great importance in the English business world. Undoubtedly, the introduction of more up-to-date methods had a great influence on shopping in London. This influence was quickly seen in the endeavors of old-established, conservative firms with few merchandise departments to bring themselves into a position to compete with the new methods. The finest and best-appointed department store in the United States is believed to be in Chicago; Philadelphia and New York have several whose names are recognized throughout the continent. The most noted department store in Canada is in Toronto. See CHAIN STORES. F.H.E.

DE PAUW UNIVERSITY. See INDIANA (Education).

DEPENDENCIES OF FALKLAND ISLANDS. See FALKLAND ISLANDS.

DEPENDENT PENSION. See PENSION.

DEPEW, CHAUNCEY MITCHELL (1834-1928), an American lawyer, orator, and former United States Senator, born in Peekskill, N. Y. He was graduated from Yale College in 1856, immediately took up the study of law in Peekskill and New York City, and was admitted to the

bar in 1858. He was made attorney and director of the consolidated Hudson River and New York Central railroads in 1860, became general counsel for the Vanderbilt railroad system in 1875 and president of the New York Central Railroad in 1885. The degree of LL.D. was conferred upon him by Yale College the same year. In 1898 he was elected chairman of the board of the New York Central, and became a director in many other corporations.

After middle life he had an eventful political career. He figured prominently as a Republican Presidential candidate in 1888, but withdrew in favor of Benjamin Harrison, who after his election tendered Depew the portfolio of the Secretary of State, which he declined. From 1899 to 1911, he was United States Senator from New York. Depew's charm as an orator, lecturer, and after-dinner speaker made him famous the world over. He was twice married, first in 1871 to Elise Hegeman, who died in 1893, leaving one son. Miss May Palmer, many years younger than himself, became his wife in 1901.



Photo: P. & A.

CHAUNCEY M. DEPEW

DEPOSITION, *dep o zish' un*, a generic expression which embraces all written evidence verified by oath, including affidavits. But as a word of legal terminology, it is usually limited to the testimony of a witness, taken in writing, under oath or affirmation, before some judicial officer, in answer to interrogatories, oral or written.

Distinguished from Affidavit. There is a distinction between a deposition, in its restricted sense, and an affidavit, the former being confined to written testimony in legal proceedings, and being compulsory and made after notice, and the opposite party being afforded opportunity to cross-examine the witness; while an affidavit is voluntary. See **AFFIDAVIT**.

DEPOSITION, one of the agencies ever at work changing the contour of the earth. See **GEOLOGY** (Nature and Scope).

DEPTH BOMBS. See **SUBMARINE MINE** (Observation Mines).

DEPTHS OF OCEAN. See **OCEAN**.

DE QUINCEY, de kwin' sie, THOMAS (1785-1859), one of the foremost English essayists, whose most famous work, *The Confessions of an English Opium-Eater*, is unsurpassed as an example of imaginative, rhythmical prose. This is not only a masterpiece of autobiographical

writing, but an important contribution to English literature, for it showed what possibilities exist in English prose when it is handled by a writer of extraordinary imaginative power.

De Quincey, the son of a wealthy merchant of Manchester, was left fatherless at the age of seven. He was sent to the grammar schools of Bath and Manchester, and at the latter institution was so unhappy that he ran away. After several months of adventure among the hills of Wales and in London, his family found him in a half-starved condition and sent him to Worcester College, Oxford. There he remained five years, but was too irregular in his studies to win a degree. During his college career, he began to take opium, in order to deaden the unbearable pains of neuralgia, and the habit never wholly relaxed its grip on him.



Photo. Brown Bros.

THOMAS DE QUINCEY

De Quincey left college in 1807, and the following year settled at Grasmere, in the Lake country, to enjoy the companionship of Wordsworth, Coleridge, and Southey. In 1821, the year in which his *Confessions* appeared, he removed to London. Having begun to write for the famous Scottish periodical, *Blackwood's Magazine*, he settled in Edinburgh in 1828, and in or near this city resided for the rest of his life.

His Important Books. The greater part of De Quincey's work was published first in periodicals—*Blackwood's*, *Tait's*, and the *London Magazine*, and later issued in book form. His *Murder Considered as One of the Fine Arts* is a striking example of grim humor; *On the Knocking at the Gate in Macbeth* and *Literary Reminiscences* represent his genius for sympathetic and imaginative criticism. Among other brilliant essays are *The Flight of a Tartar Tribe*, *Joan of Arc*, and *The English Mail Coach*.

DERBY, a style of hat for men. See **HAT**.

DERBY, CONN. See **CONNECTICUT** (back of map).

DERBY, FREDERICK ARTHUR STANLEY, sixteenth Earl of (1841-1908), a British statesman and colonial administrator, perhaps better known as **BARON STANLEY OF PRESTON**, the title he bore during the years he was Governor-General of Canada, which post he held from 1888 to 1893.

After a brief career in the army, he was elected to the House of Commons in 1865. Between 1874 and 1880, in Disraeli's Ministry, he was in turn Financial Secretary of War, Financial Secretary to the Treasury, and

Secretary of State for War. He was Secretary for the Colonies in the Salisbury Ministry from 1885 to 1886, and then served for two years as President of the Board of Trade. He had been created Baron Stanley of Preston in 1886, and in 1893, soon after his return from Canada, succeeded his brother as Earl of Derby. From 1900 to 1903, his son was Financial Secretary to the War Office, and then for two years was Postmaster-General.

DE RESZKE, *de resh' ke*, the family name of two brothers, famous in grand opera. See RESZKE, DE.

DERMAL SENSES. See CHILD (Development of the Senses).

DERMIS. See SKIN.

DERVISH is the general term applied to members of Mohammedan religious fraternities who lead solitary, self-denying lives, who solicit alms, and are subject to peculiar religious frenzies. Their origin dates back to the earliest days of the Islam faith. There are various orders, or brotherhoods, whose rituals may consist of the repetition of certain prayers or supplications to Allah, of the elaborate whirlings or writhings of the dancing dervishes, or of the frenzied performances of the howling variety, who shriek, mutilate their bodies, and swallow hot coals and serpents. They are supposed by the faithful natives to possess miraculous healing and divining powers, and they exercise considerable influence over the lower classes. Whether as fanatics or as fakirs, they contribute an important share to the mysticism of the East.

Derivation. The word *dervish* is from the Persian, and means *seeking doors*, or *beggar*.

DESCARTES, *da kahrt'*, RENÉ (1596-1650), a celebrated French scholar, whose achievements in philosophy have won him the title "father of modern philosophy," and who is also honored as the inventor of analytical geometry. At the Jesuit College at La Flèche, he was regarded as one of the most promising boys in the school, but it is significant that when he left there, at the age of sixteen, he threw aside his books and endeavored to forget everything he had learned. This was the result of his dissatisfaction with prevailing methods and theories of learning, which made him resolve to keep his mind open to the reception of the truth as it should be presented to him.



Photo. Brown Bros.
DESCARTES

In 1617 he entered the army, but, not finding the life of a soldier much of an aid in the search for truth, he abandoned his military career and settled in Holland. In that country, he worked out his philosophical system, wrote his most important books, and gathered about him a group of disciples. In 1649 he accepted an invitation from Queen Christina to go to Sweden, but died a few months after arriving at her court.

By establishing an original philosophic principle, Descartes began a new era in the history of philosophy. He asserted, first, that, as all existing knowledge rested on an unstable foundation, the first step was to doubt everything that could be doubted. He found the only indisputable fact to be his own existence as a doubter and a thinker. That is, he knew that he thought, and therefore could not doubt that he, the thinker, existed. This relation he expressed in the now-famous saying, *Cogito, ergo sum* (I think; therefore I exist).

Beginning with his own self-conscious existence, he reasoned that there were other ideas as clearly and distinctly true as the surety of one's existence; the first of these ideas is that God is the absolutely perfect being. We do not of ourselves originate this idea, because the imperfect cannot originate the perfect, but it is formed in our minds by God himself. The principles thus absolutely and directly known he classified as innate ideas.

The influence of Descartes was as far-reaching on the progress of mathematics as on philosophic thought, and he ranks among the foremost mathematicians of his time.

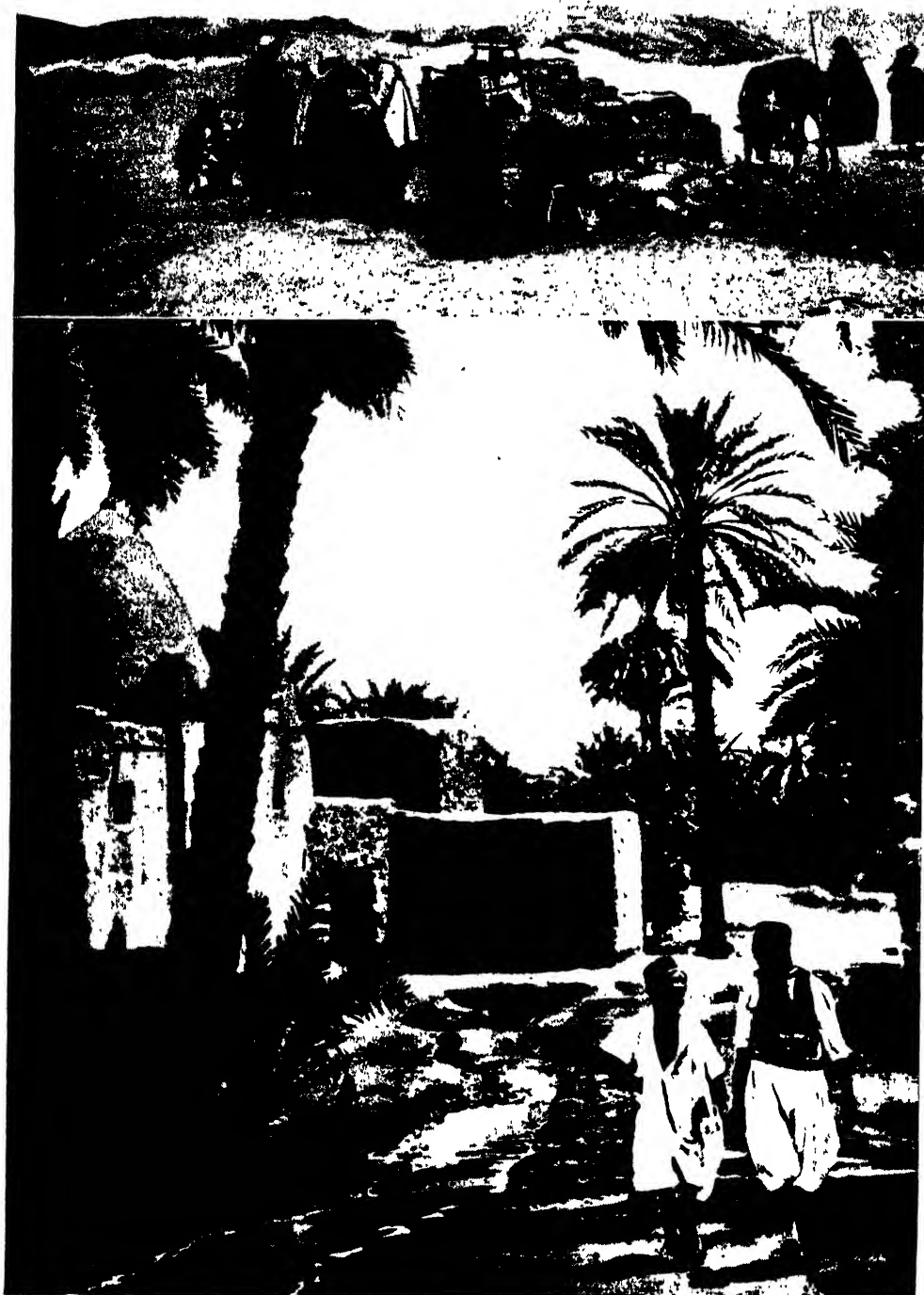
His Books. The most important writings of Descartes include *Essays*, *Geometry*, *Discourses on the Method of Reasoning*, and *Principles of Philosophy*.

DESCENDING COLON. See ABDOMEN; INTESTINE.

DESCHANEL, *da sha nel'*, PAUL EUGENE LOUIS (1856-1922), the President of France during the year 1920, successor to Raymond Poincaré, the great war President. Deschanel entered public life soon after completing his education at the College Sainte-Barbe and Lycée Condorcet. He filled the humbler stations of prefect in the departments of Brest and Seine-et-Marne, and then was elected to the national Chamber of Deputies in 1896, of which he became presi-



Photo. Brown Bros.
PAUL DESCHANEL



Photos O R O C; Visual Education Service

Moist Spots in Arid Wastes. In the Libyan Desert, west of the Nile, thirsty nomads come to this desert well. The lower illustration shows a typical oasis of the Algerian Desert, with a street scene and a characteristic building. See article **DESERT**, page 1916.



The Desert of Song and Story. Not on all deserts does the sand lie wavelike, as in the lower picture from the Sahara; the surface may be hard and stony. Above, the devout Mohammedan removes his shoes, lifts his hands, and begins his prayer to Allah. See article **DESERT**, page 1916. 1915

Photos: P & A; OROO



Mohammedans at Prayer. Whether alone in the desert or on a crowded street, the devout Mohammedan observes a strict compliance with devotional commands. He must face towards Mecca, must remove his shoes, and must prostrate himself on his prayer rug.



Mohammedans at Prayer. Whether alone in the desert or on a crowded street, the devout Mohammedan observes a strict compliance with devotional commands. He must face towards Mecca, must remove his shoes, and must prostrate himself on his prayer rug.



Photo U & U

AIRPLANE VIEW OF IOWA'S CAPITAL CITY

Des Moines College), a Danish Lutheran College, Cumming School of Art, Des Moines School of Arts, two business colleges, and a College of Osteopathy. A military post was established here by act of Congress in 1910, the land and equipment costing \$1,200,000. The state capitol cost \$3,000,000.

History. The first Fort Des Moines was established here in 1843, to protect the rights of the Sacs and the Foxes, and the place was opened for settlement the same year. It was incorporated as a town in 1851, and in 1857 became a city and also the state capital, the seat of government being removed from Iowa City to secure a more central location. In 1907 the city adopted a new charter embodying what is known as the "Des Moines Plan." It provides for a ruling council of five, chosen biennially, nominated at a non-partisan primary and voted for on a non-partisan ticket by the electors of the entire city. The city has the power to recall any commissioner and can compel the passage of any law or ordinance. See COMMISSION FORM OF GOVERNMENT.

The name of the city is taken from that of the river, which the Indians named *Moingona*. Trappist monks early visited this country, and the stream came to be the Des Moines, meaning *of the monks*.

DES MOINES PLAN. See above.

DES MOINES RIVER. See IOWA (Its Waters).

DE SOTO, de so' toh, FERNANDO (1500-1542), a hardy and intrepid Spanish explorer who earned a place for all time in the lists of famous men by his discovery of the Mississippi River. After he had become famous and wealthy in the conquest of Peru, De Soto returned to Spain, but was sent to be governor of Cuba and Florida, in 1539. No man had previously dared to enter the heart of what is now the Southern United States, but De Soto planned many brilliant adventures in that section when he started out with his company of 600 men. Led astray by false Indian guides through the dense jungles, he lost many of his followers in hostile attacks from the red men. After three years of wandering, De Soto and the few who still lived started back home, but the leader died of fever and was buried in the depths of the great river he had discovered. The survivors built crude boats and floated down the Mississippi, to find refuge in the Spanish settlements on the coast of Mexico.

Three early accounts of this great expedition were written; two of them were by men who accompanied De Soto, the third and most



Photo: Visual Education Service

THE BURIAL OF DE SOTO

Moonlight mass was celebrated as the body of the great explorer was lowered into the depths of the river that he discovered [From an old painting]

famous by the Inca historian, Garcilazo de la Vega. The latter, however, is little read. See MISSISSIPPI RIVER.

DES PLAINES, *dez-playnz'*, RIVER. See ILLINOIS (Physical Features).

DESTINN, *des'tin*, EMMY (1878-1930), a Bohemian operatic soprano who became a general favorite with American audiences.

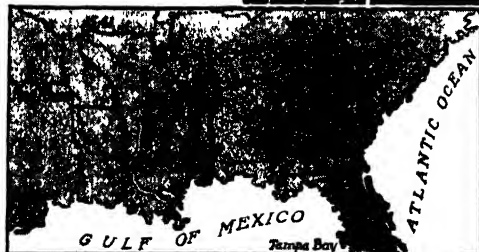


Photo: Brown Bros.

FERNANDO DE SOTO

Portrait of the explorer and map of his route through the Southern United States

She began her musical education with lessons on the violin, in her native city of Prague, but

later commenced training for the operatic stage under the direction of Madame Loewe-Destinn. Substituting her teacher's name for her family name, Kittl, she made her debut in 1897 as Santuzza (in *Cavalleria Rusticana*), at the Royal Opera House, Berlin. Though her success in this rôle established her position as an operatic soprano, she first became widely famous on her appearance as Senta in the initial performance of Wagner's *Flying Dutchman*, at Bayreuth (1901).



EMMY DESTINN

Six years later, she was invited by Strauss to act the rôle of Salome at the first Paris production of that opera. The year 1908 marked her first appearance in America, at the New York Metropolitan Opera House. Included in her repertory of over eighty operas were *Aida*, *Mignon*, *Tannhäuser*, *The Magic Flute*, *La Bohème*, *Madame Butterfly*, and *The Flying Dutchman*, the soprano rôles of the two latter being her favorite parts.

DESTROYER. See TORPEDO BOAT.

DESTROYING ANGEL, one of the mushrooms. See MUSHROOMS.

DESTRUCTIVE DISTILLATION. See DIS-TILLATION.

DETECTOR. See RADIO COMMUNICATION.

DETERMINISM, *de ter' min iz'm.* See FREE-WILL.

DETONATOR. See FULMINATION.



D *The Story of DETROIT*

DETROIT, MICH. The name of this largest city of Michigan is a French word meaning *strait*, emphasizing its location on the short river that connects Lake Erie and Lake Saint Clair, but if it were to be rechristened, it would possibly bear some name referring to the manufacture of automobiles. For Detroit, within a score of years, developed from a position of minor importance to fourth place among the cities of America in manufacture and in population, because there were shrewd capitalists who foresaw the future of the automobile and established the industry in their city when "horseless carriages" were a novelty.

In the United States to-day, only New York, Chicago, and Philadelphia surpass Detroit in population and in value of manufactures, and in the world the "City of the Straits" is the undisputed leader in the production of automobiles. Within ten miles of its city hall there are more men who possess a scientific knowledge of automotive engineering than can be found in any other like area on the face of the globe.

Detroit is the county seat of Wayne County; it is situated near the southeastern border of the state, at a point where the Detroit River separates the United States from Canada. Lansing, the state capital, is eighty-six miles northwest; Toledo, O., sixty-two miles distant, is almost directly south; and Chicago is 284 miles west and south.

The land on which Detroit is built rises gently from the river. This stream, which is half a mile wide, is fed by the Great Lakes, and constitutes one of their best harbors. The largest vessels easily navigate the river, which is sometimes called the "Dardanelles of America," because it connects two inland seas. Along the river front for several miles, the shore is lined with wharves, elevators, and warehouses, and here the railroads have located passenger and freight stations. To the north, at a distance of about twenty miles, lie the Saint

Clair Flats, a beautiful summer-home district, where many wealthy Detroit merchants have built handsome homes. Windsor, across the river, is in reality a suburb of Detroit, and is a terminus of Canadian traffic. Fort Wayne, with its extensive batteries, was built to guard the channel, but its defenses are obsolete.

According to estimate of the Federal Bureau of the Census, the population of Detroit in 1928 was 1,378,900; in 1925 an official census reported 1,242,044 people in the city. Germans, Russians, and Polish predominate in a mixed foreign element, which comprises about one-third of the total population. Including the cities of Hamtramck and Highland Park and several outlying villages, the population of Greater Detroit has reached a total of over 1,400,000.

Parks and Boulevards. Detroit is one of the most beautiful cities in the Union. Its park reservation of 2,000 acres is divided into thirty-two parks, the most noted of these being Belle Isle (750 acres), an island of great natural beauty, on which about \$5,000,000 has been expended. It lies in the river opposite the eastern section of the city, the two being connected by a vehicular and foot-passenger bridge which was constructed at a cost of \$3,000,000. Among its many points of interest is a fountain for which the late James Scott gave his entire fortune of \$500,000. Palmer Park, a forest of 141 acres, has a colonial log house, a colonial casino, and a collection of colonial relics. Grand Circus is a semicircular park of five acres in the heart of the city, from which the streets radiate as from the hub of a wheel; their intersections of streets running at right angles form a number of triangular parks, some of which are ornamented with beautiful fountains. The Campus Martius is a large plaza between Grand Circus and the river, around which are clustered some of the city's finest public and office buildings. It gives an impression of light and space seldom found in the business district of a large city. The plaza con-

tains the Michigan Soldiers' and Sailors' Monument, facing the city hall.

The streets of Detroit are broad, well shaded, and well kept. Woodward Avenue performs the double duty of business street and residential boulevard. It begins at the river, and, passing through Grand Circus, the residential district, and beyond the limits, divides the city into halves. Griswold Street is the Wall Street of Detroit. There are fine residential districts along Boston and Chicago boulevards, in Indian Village, Virginia Park, and in Arden Park, but the city's pride is Grand Boulevard, which begins at the river on the east and winds about the city to the river on the west.

Buildings. The skyline of Detroit suggests that of New York or Chicago to one approaching the city from the Canadian side. Eaton Tower, the Book Tower, and other buildings of the skyscraper type give the city a metropolitan appearance that is in keeping with its size and prosperity. Mention should be made, too, of the immense General Motors Building, home of the Cadillac, Buick, and other well-known motor cars; the great Ford plant; the Fisher Building, 420 feet in height; and the magnificent Masonic Temple, largest of its kind in the world.

Institutions. The city is the site of Detroit University (opened by the Jesuits in 1877 as Detroit College), Michigan College of Medicine

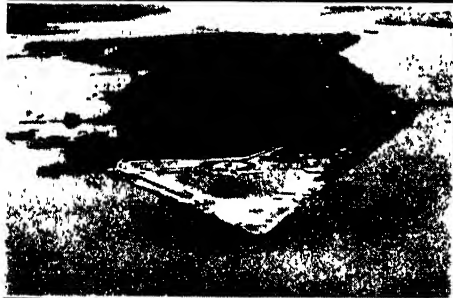
and Surgery, Detroit College of Law, and Detroit Homeopathic College. There are eighteen branches of the central library, which alone contains 280,000 volumes. These are housed in a beautiful white marble building located at Arts Center, opposite the new Art Institute. This museum has a fine collection of historic and scientific relics valued at \$300,000, including the Scripps gallery and the Stearns collection.

Transportation and Commerce. Excellent rail service is afforded by the Grand Trunk (a part of the Canadian National system), the Michigan Central (New York Central), the Wabash, the Pere Marquette, the Pennsylvania, the Detroit & Toledo Shore Line, the Canadian Pacific, the Baltimore & Ohio, and the Detroit, Toledo & Ironton railroads. The last named is owned by Henry Ford, who largely rebuilt and partially electrified it. Motor-truck freight service for short-haul business has undergone rapid development. In 1929 a great tunnel was begun, to connect Detroit and Windsor. In the same year, the \$20,000,000 Ambassador Bridge, between the city and Canada, was opened.

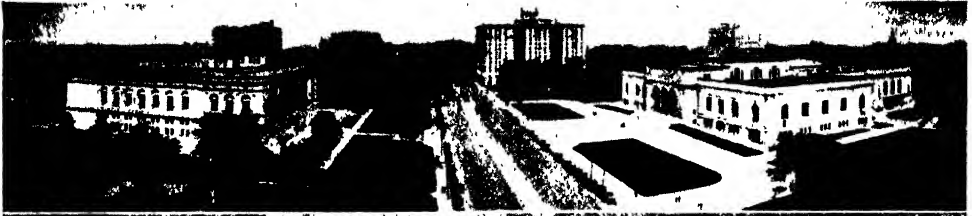
Detroit is the gateway for all the commerce between the eastern and western lake ports and for a large part of the railway passenger and freight traffic between Canada and the Middle West (see SAULT SAINTE MARIE CANALS).



A MOTORS BUILDING IN THE MOTOR CITY
One of the largest buildings in the world.



In the Country's Fourth City. Masonic Temple, said to be the largest in the world. Belle Isle Park, devoted wholly to recreation. Campus Martius, with the city hall in center. 1921



Other Views of Detroit. At top, public library at left and Art Institute at right. Center, Grand Circus Park; the obelisk-like building is Eaton Tower. Below, Washington Boulevard, looking south.

The volume of trade and travel has been further increased by the construction of a tunnel under the Detroit River by the Michigan Central Railroad. The chief exports are automobiles and accessories, grain, flour, hogs and hog products, cattle, beef, hides, sheep, wool, cotton, coal, and iron and steel products. The city also receives either for its own use or for shipment immense quantities of the agricultural and dairy products of the state. Detroit has the largest dry dock on the Great Lakes. A United States internal-revenue office and a bureau in charge of lake lighthouses are located here. All freighters receive and deliver mail at this point, without stopping.

Manufactures. The United States Census of Manufactures reports the value of Detroit's products to be over \$1,600,000,000. The automobile industry alone employs over 200,000 persons, and in average years 2,500,000 vehicles are produced. In the beginning, Detroit was the logical point for the establishment of this great enterprise, as it was largely engaged in the manufacture of marine gasoline engines, and the state was already noted for making fine carriages. But the making of motor vehicles is not the only employment of the people of Detroit, as the city also has extensive manufactures of aluminum castings, adding machines, brass and bronze products, druggists' preparations, machine tools, alkali products, stoves, furnaces, and varnishes.

Detroit has also conducted a determined campaign to make the city the aircraft manufacturing and commercial center of the United States. It has now three major airports, the Ford Airport, owned and operated by the Ford Motor Company; the County Airport, a mile square, around which aircraft manufacturers can locate; and the Detroit Municipal Airport, five miles from the business center of the city, which is being developed into an air-transportation terminal. In the airplane field, there were in 1930 three companies manufacturing planes on production—the Stout Metal Airplane Company, a division of the Ford Motor Company; the Stinson Aircraft Corporation, and the Buhl Aircraft Company. There are also several companies manufacturing airplane motors—the Packard Motor Company, the Warner Aircraft Corporation, and the Continental Motors Corporation. In the lighter-than-air field, Detroit is represented by the Aircraft Development Corporation, designers and builders of the first all-metal dirigible. This corporation has also built the world's largest mooring mast, at the Ford Airport of this city. See AIRCRAFT.

History. As early as 1648, this site was visited by Frenchmen, but no permanent settlement was made until 1701. In that year, Antoine de la Mothe Cadillac, the first commandant of the French possessions in this locality,

reached the location of the future city in about two dozen canoes, carrying Frenchmen and Indians; he built Fort Pontchartrain and garrisoned it with fifty soldiers and fifty colonists. In 1760, at the close of the French and Indian War, Major Robert Rogers seized the place; it suffered frequent attacks by Indians under Pontiac in 1763, but was saved by a heroic defense. In 1778, when the British built Fort Lernoult, there were about 1,280 white inhabitants and eighty slaves, the settlement consisting chiefly of log cabins and a Roman Catholic church; the name was changed to Fort Shelby in 1796, and there were then 2,525 white people and 140 slaves.

The town was incorporated in 1802, but three years later was almost completely destroyed by fire, only two buildings being left standing. Rebuilding was commenced at once on a large scale, and the new settlement in the same year became the capital of Michigan Territory. It was taken by the British in the War of 1812, and was retaken by the Americans in 1813. Detroit was incorporated as a village in 1815, and as a city in 1824. In 1837 it became the seat of government of the newly created state of Michigan, and remained so until the capital was removed to Lansing in 1847. In 1901 the city celebrated the bi-centennial anniversary of its settlement.

During the World War, Detroit was active in the service of the allied cause, because of its great production of Liberty motors for airplanes, and of vast quantities of other war material. In 1920 the electorate approved a plan for the municipal construction and operation of street railway lines. Since then, the city has purchased the Detroit United Railway within the corporate limits, and made extensive additions to its properties.

O.P.B.

DETROIT RIVER, a short stream, or strait, connecting Lake Erie and Lake Saint Clair, and forming part of the boundary between the state of Michigan and the province of Ontario. It is one of the world's most important commercial highways, and carries more tonnage of shipping than any other American river, for all the grain shipped by boat from the great Northwest and all the immense lake shipments of iron ore from Minnesota, Wisconsin, and Northern Michigan to the East pass through Detroit River. It is twenty-eight miles long, and its depth is sufficient to permit the passage of the largest vessels afloat. Its breadth varies from one-half mile to three miles. The scenery along its banks is inviting, and its upper section, called the Saint Clair Flats, is beautiful in spots, being studded with islands which are very popular as summer resorts.

Derivation. The name *Detroit* is derived from a French word meaning *strait*.

DEUCALION, *du ka' lih on*, the Noah of Greek mythology, was the mythological son of Prometheus. He and his wife Pyrrha, as faithful servants of the gods, were the only ones saved when Jupiter caused a deluge to destroy the world on account of the wickedness of mankind. In a wooden chest, made on the advice of Prometheus, Deucalion and Pyrrha floated on the waters nine days, finally landing on the summit of Mount Parnassus. When the deluge subsided, finding the land depopulated, they sought the oracle at Delphi for information as to how they could repopulate the earth. They were told to throw behind them the bones of their mother. Interpreting that to mean their mother earth, they threw stones over their shoulders, which on striking the earth became men and women, strong and hardy. Deucalion became the ancestor of the Greeks through his son Hellen. See PROMETHEUS; PYTHON (myth).

DEUCALION'S FLOOD. See DEUCALION; DELUGE.

DEUTERONOMY, *du tur on' o mie*, the fifth book of the Old Testament, in which Moses imparted to the Israelites, whom he had led through the Wilderness, the law of their nation. It is therefore known as the *Book of the Law*. These people, most of whom were children when they left Egypt, had traveled nearly forty years, and were on the eve of entering Canaan, the Promised Land. Before they crossed the Jordan, Moses gathered them around him in the valley to deliver his farewell address, for God had told him that he could not enter with them because of his disobedience (see MOSES). Moses wished the people to understand the principles of their national law, which was given to their fathers on Mount Sinai. After giving his address, Moses appointed Joshua as his successor, to rule the people when they entered the Promised Land. In the last chapter, there is a record of Moses' death and burial in the land of Moab. The language of this book is remarkable for its strength and beauty. It is supposed that a portion of Deuteronomy was discovered during the reign of Josiah (*II Kings* XXII, 8).

DEUTSCHE. See GERMANY.

DE VALERA, *d' val a' rah*, EAMON (1882-), Irish politician. See VALERA, EAMON DE.

DEVELOPING, in photography. See PHOTOGRAPHY.

DEVIATION OF THE COMPASS. See COMPASS.

DEVIL, also called SATAN, the chief evil spirit, the author of evil and the opposer of God.

Most religions recognize one or more evil spirits, and acknowledge in their creeds a constant warfare between the good and the evil spirits. In most instances, this warfare is moral;

but among some peoples disease, suffering, and such calamities as famine, hail, and flood are attributed to evil spirits, and among the early Christians these were believed to be the work of the Devil. There are doubtless some still who hold to that belief.

There is a distinction between evil spirits and the evil spirit who is the Prince of Darkness; evil spirits are supposed to be demons— aids of the Devil. The devils so often mentioned in the New Testament were demons who possessed certain people, according to popular belief, and whom Christ cast out. This belief in demons among the Jews is similar to the beliefs of the ancient Greeks, Romans, and other European peoples in various gods to whom they attributed all sorts of characteristics. The ancient Germans believed in the personality of the evil spirit, and had a common proverb, "Where the Devil cannot come, he sends his grandmother." Others believe the Devil to be a fallen angel. This is Milton's idea, in *Paradise Lost*, where he says:

From morn

To noon he fell, from noon to dewy eve—
A summer day and with the setting sun,
Dropt from the zenith like a falling star

Derivation. The word *devil* is from the Greek language, and means *slanderer*, or *false accuser*. *Satan* in Hebrew means *enemy*, and when used in this sense, means the enemy of God and man. But *Satan*, as used in *Job*, means an *accuser*, and is applied to one of God's messengers who appear before God (*Job* 1, 6). In the third chapter of *Genesis*, the serpent is represented as the author and introducer of evil to man, and for this reason the Devil is sometimes called the *Serpent*.

DEVIL FISH. See RAY.

DEVIL POSTPILE MONUMENT. See MONUMENTS, NATIONAL.

DEVIL'S DARNING NEEDLE, a name given by boys and girls to the dragon fly (which see).

DEVIL'S ISLAND. See FRENCH GUIANA.

DEVILS LAKE. See NORTH DAKOTA (Rivers and Lakes).

DEVIL'S SNUFF BOX. See MUSHROOMS.

DEVIL'S TOWER. See MONUMENTS, NATIONAL; WYOMING.

DEVIL'S TRUMPET. See STRAMONIUM.

DEVIL WORSHIP, the practice of certain barbarian tribes of Asia, Africa, and South America, who worship the Devil on the principle that the powers of evil are as much to be reckoned with as those of good, and must be placated. The Yezidees, or Devil worshippers of Turkish and Russian Armenia and the valley of the Tigris, observe some Christian ceremonies, such as infant baptism, and revere the authority of the Old Testament in preference to that of the New Testament or of the Koran. Their worship includes Christ, the Devil, Allah, and the sun.

DEVONIAN, *de vo' nih an*, **PERIOD**, the fourth period of the Paleozoic Era, succeeding the Silurian and succeeded by the Carboniferous Period. The name was given from the English county of Devon, where the Devonian rocks are chiefly sandstones, limestones, and limy slates. The Old Red Sandstone is another important British formation of the Devonian age. Rocks of this period are also common in Cornwall, adjoining Devon.

Devonian rocks are found in many regions throughout the world. In North America, the system is best developed in the northern Appalachian region and in the North-Central states. The Catskill Mountains in New York are made up almost wholly of Devonian strata. The Devonian formations of the Eastern United States are the source of valuable economic products, including petroleum, natural gas, bluestone, and materials for making cement.

The Devonian rocks abound in fossils. Among the plants are remains of gigantic horsetails and club mosses, foreshadowing the wealth of vegetation which was to follow in the Carboniferous Period. There were shellfish of all descriptions, and in some localities extensive beds of coral. Starfish, lobsters, and horseshoe crabs were common. Fishes reached a high development, and the period has often been called the *Age of Fishes*. Sharks lived in both salt and fresh water, and other large fishes, some over twenty feet in length, were common.

The fossil record of land life includes snails, insects, myriapods, scorpions, and amphibians.

L. L. F.

Related Subjects. To connect this period of geologic time with others, and to understand its history more clearly, the reader should consult the following articles in these volumes.

Carboniferous Period	Old Red Sandstone
Fossil	Paleozoic Era
Geology (Divisions of Geologic Time)	Silurian Period

DEVONSHIRE, *dev' on sheer*, VICTOR CHRISTIAN WILLIAM CAVENDISH, Ninth Duke of (1868-), appointed in 1916 to succeed the Duke of Connaught as Governor-General of Canada. He served until June, 1921. The duke was educated at Eton and at Trinity College, Cambridge, and in 1891 entered the House of Commons as a Liberal-Unionist. He continued to sit in the House until 1908, when he succeeded to the dukedom on the death of his uncle, the eighth Duke of Devonshire. He was from 1900 to 1903 treasurer of His Majesty's household, and was then for two years Financial Secretary to the Treasury. He is Lord-Lieutenant of Derbyshire and chancellor of Leeds University. His wife, whom he married in 1892, was Lady Evelyn Fitzmaurice, daughter of the fifth Marquis of Lansdowne, who was Governor-General of Canada from 1883 to 1888.

The Duke of Devonshire is one of the great landowners of Great Britain. His estates amount to nearly 190,000 acres, including mineral lands and forests. He owns a valuable library of rare books and an art collection which is world famous. He is an ardent sportsman, particularly fond of hunting, is known as a patron of science, and is regarded as one of the most charming and democratic of the British peers.

DEW. When you go into the garden on a bright summer morning you find drops of water on the grass, leaves, and flowers, glistening in the sun. What are they? Where did they come from? First, these tiny sparkling drops are *dew*; second, they come from the air and the ground.

How Dew is Formed. The atmosphere at all times contains water vapor; the warmer the air becomes, the more vapor it may contain. When the atmosphere cools, some of the vapor is condensed and forms water. This is what happens when a pitcher of ice water is set in a warm room; the moisture that collects on the outside of the pitcher is taken from the air that comes in contact with it. Dew is formed in the same way. At night, the earth gives back to the atmosphere some of the heat that is absorbed from the sun during the day. Much of this heat passes off through the blades of grass and the leaves of plants, which become cooler than the surrounding air, and they therefore condense the moisture in the same way that the pitcher does.

The largest quantity of dew is formed on a clear, still night, when there is nothing to prevent the radiation of heat or to disturb the atmosphere. The layer of air next to the earth then becomes cooled and gives up its moisture. Wind prevents the formation of dew, because it keeps the atmosphere in motion and there is no chance for it to become cooled by contact with the plants. Clouds often prevent dew, because by reflection they send the escaping heat back to the earth and prevent sufficient cooling of the plants to enable them to condense the moisture. For the same reason, dew is seldom formed under trees or other objects which reflect the heat to the earth.

Some of the dew on plants rises from the earth in vapor form and is condensed in the same way as that from the atmosphere. Those objects which cool most rapidly collect the most dew. A board, for instance, is a poor radiator and collects but little dew, but large drops may collect on the head of a nail driven into the board. The ground under the board is dry, because there is no chance for the heat to escape from the covered ground. The heaviest dews are in tropical regions, where there is the greatest difference in temperature between day and night. In regions having little rainfall, dew is of the greatest value to vege-

tation. When the temperature is below the freezing point, *frost*, instead of dew, is formed. See FROST.

R.H.W.

DEWBERRY, a berry larger and more resistant to disease than the better-known varieties found in gardens. It is not a new variety, for it has been known for years; but it has been rediscovered, in a sense, through the efforts of the United States Department of Agriculture. The new dewberry is a hybrid (see HYBRID) with a rich wine color; it is somewhat darker than the loganberry, and is sweeter. The new berry is suitable for



THE DEWBERRY

The ripened fruit and characteristic form of the bush culture south of the Mason and Dixon's Line and west as far as Arkansas and Texas.

This new fruit owes its origin to B. M. Young, an electrical engineer, who lived in Louisiana. As a hobby, he indulged in plant breeding some years ago, and produced the superior Young dewberry by a cross between the Phenomenal and Mayes varieties. It was not destined to take its place in the world at once, for Mr. Young was so busy in his profession that his creation was nearly lost when the original plants were destroyed. However, he gave some plants to a friend in Pennsylvania. This friend sent some to the United States Department of Agriculture and to a sister living in Alabama, and it was in her garden and in the Department's grounds that the superior fruit was rediscovered only recently. So important did government officials consider the size and disease-resistant properties of the berry, that they sent a horticultural expert to examine all plantings of it. Sufficient stock of the new fruit has been propagated to release the new variety to the public through nurseries. It is believed that there is a possibility that the Young dewberry may even replace the loganberry on the Pacific coast.

Dewberries and blackberries are very similar fruits, and are practically the same botanically. The dewberry is a trailing blackberry, unable to stand erect without support, because of its less woody stem. See BLACKBERRY.

DEWEY, GEORGE (1837-1917), an American naval officer, known as the "hero of Manila," the first American officer after David Porter to be raised to the rank of admiral. In his late years, he was named admiral of the navy, the only American ever to have held this supreme distinction, the post being higher than that of admiral. His early education was received in his home city, Montpelier, Vt., and at Norwich University. At the age of seventeen, he entered the Naval Academy at Annapolis, graduating fifth in his class. In 1862 he received a lieutenant's commission, was assigned to the sloop *Mississippi* under Farragut, and took part in the famous run past the forts that guarded New Orleans. He was commissioned lieutenant commander in 1865, and served on the *Colorado* and *Kearsarge* for two years. In 1872 he was given command of the *Narragansett* in the Pacific Survey.

When war was declared between Spain and the United States in 1898, Dewey was in Hong Kong in command of the Asiatic squadron, having risen to the rank of commodore. The cable bore him this message: "Proceed at once to the Philippine Islands. Capture or destroy the Spanish fleet."

Forty-eight hours later his six vessels, with the *Olympia* at their head, were steaming toward Manila Bay. On May 1, 1898, he opened fire on the Spanish fleet of ten war vessels and two torpedo boats, and about noon of that day the last Spanish flag had been hauled down and the entire fleet destroyed. Not one American vessel was seriously disabled; not one man had been killed, and only seven were injured. See SPANISH-AMERICAN WAR.



GEORGE DEWEY

He was soon after appointed admiral by President McKinley; Congress presented him with a sword, and all of his men received medals. On his return to New York, in 1899, he received an ovation, and the people of the country, through popular subscription, presented him with a residence in Washington. In 1901 he was president of the Schley court of inquiry (see SCHLEY, WINFIELD S.), and a year later was placed in command of all united squadrons and fleets of the American navy. In 1908 he assumed the presidency of the naval board of strategy. At the time of his death, he was the ranking naval officer of the world, by seniority. In 1925 his body was

placed in the Cathedral of Saints Peter and Paul, in Washington, where it lies near the tomb of Woodrow Wilson. See PHILIPPINE ISLANDS (History: The Americans Arrive).

DEWEY, JOHN (1859-), a distinguished American educator, philosopher, and psychologist, who has attracted wide attention in the educational field because of his theory of "immediate empiricism." According to this theory, things are what they are as shown by experience, and knowledge itself is a form of experience. Professor Dewey, in his teaching, makes practical applications of his views.

He was born in Vermont, and was graduated in 1879 at the University of Vermont, receiving, in 1884, the Ph.D. degree from Johns Hopkins University. In 1888-1889 he was professor of philosophy at the University of Minnesota, held a like position at the University of Michigan from 1889 to 1894, and between 1894 and 1904 was director of the School of Education at the University of Chicago. In the latter year he was appointed professor of philosophy in Columbia University. He is probably the leading American philosopher of his day.

His Books. Dewey's writings include, besides numerous contributions to periodicals, *Study of Ethics*, *School and Society*, *How to Think*, *Influence of Darwin on Philosophy*, *Psychology*, *Psychology of Number*, *Democracy and Education*, *Reconstruction in Philosophy*, *Human Nature in Conduct*. He has also contributed liberally to educational periodicals.

DE WITT, JAN. See NETHERLANDS, THE (History).

DEW POINT. See EVAPORATION; HYGROMETER; RAIN.

DEXTRIN, a sticky substance made from starch, which it closely resembles in its chemical composition. In the body, dextrin is formed during digestion by the action of saliva and pancreatic juice on starch. It is this substance that gives the crust of bread its sweet taste. Commercially, dextrin is manufactured from starch by application of heat or by treating it with a dilute acid. Dextrin is used for gumming postage stamps, for sticking the colors upon cloth in calico printing, for making varnish, and for numerous other purposes. See CORN (Corn Products); CALICO. T.B.J.

DEXTROSE, *deks' trose*. See GLUCOSE; BIOCHEMISTRY (Substances in Animals and Plants).



Photo Brown Bros.

JOHN DEWEY

DEY, the title of the ruler of Algeria in the days of its independence. See ALGERIA.

DHAWALAGHIRI, a mountain peak in Nepal (which see).

DHEGIHA INDIANS. See INDIANS (Quapaw).

DHOLE, *dole*, the wild dog of India. See DOG.

DIABASE is a crystalline rock, composed chiefly of basic plagioclase and pyroxene, and thus is of the same composition as basalt. As the term is used in the United States, the latter rock is an extrusive lava, while the former usually occurs in dikes. The texture is very characteristic, for the long, flat feldspar crystals, radiating in every direction, are enclosed in the pyroxene as by a cement. Olivine may or may not be present; magnetite usually is. While diabase is a compact rock, in most cases it is not quite so fine-grained as basalt, and the white, needle-like feldspars can be seen with the unaided eye against the dark background. The rock is tough, heavy, and compact, and makes good road material. In Europe, the word diabase is usually applied to an older, altered basalt, and the rock we call diabase is there called dolerite. Dikes of diabase occur almost everywhere where there are igneous rocks. See BASALT. A.J.

DIABETES, *di a be' teez*. There are two disorders known as diabetes, the more serious of which is properly called *diabetes mellitus*. The other is *diabetes insipidus*.

Diabetes Mellitus. This disorder is the one usually meant when the name diabetes is used. It is characterized by the formation of large quantities of urine, high in color, heavy in weight, and containing sugar. Back of the excess of sugar in the urine, and more fundamental, is the excess of sugar in the blood. The cause of diabetes is inability of some of the cells of the pancreas to secrete as much as is required to burn up the sugar absorbed in the body. An excess of sugar in the blood results, and the kidneys secrete some of this into the urine.

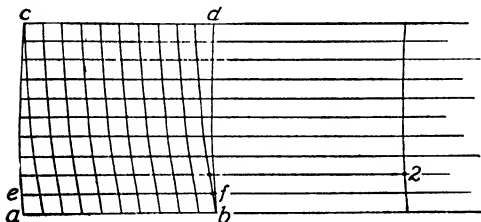
Symptoms. The symptoms of diabetes are thirst, night urination, and passing of large quantities of urine. When the urine is examined, it is found to be abundant, reddish-yellow in color, high in specific gravity, and to contain sugar in measurable percentages. Diabetics are apt to be obese, or rather, obese persons are very prone to diabetes, but emaciation may develop as the disease progresses. There is a marked tendency toward attacks of boils, carbuncles, and gangrene. Pneumonia and tuberculosis are among the infections to which diabetics are prone.

Prevention. The prevention of diabetes consists in abstaining from excessive use of starchy and sweet foods, and overcoming obesity.

Treatment. It is possible for a diabetic to live many years in reasonably good health and to do efficient work. His problem is to diet so as to supply his body with the calories needed for repair, for energy and heat, and to maintain weight without exceeding the ability of his organs to destroy sugars. He must not work beyond his capacities for food intake, he must not lose too much weight, strength, or energy, he must protect himself against infections, and above all, he must avoid attacks of acidosis. Therefore he must regulate his work, carefully control his diet, keep his skin scrupulously clean, and keep away from all sources of infection.

The most important part of his problem is dieting. He must stick to a diet which is very low in sugars and in starches. This means it must be fairly rich in fats and proteins in order that there may be enough calories, but if the fats are in excess, acidosis results. For guidance especially in dieting, there are several simple books available. These are written in clear language, and they contain diet lists and recipes. Insulin, discovered by Banting of Canada, is a pancreatic extract which when injected into the body is capable of destroying sugar. By the use of insulin, a person can increase the amount of sugar and starch in the diet. Every diabetic should put himself under a physician's direction. When possible, he should join a class for diabetics. He should learn to test his urine for sugar, to keep a record of his weight, his urine sugar, and his diet. He should learn to calculate calories and to make up diets suitable to himself. He should learn how to keep his skin clean and to avoid infections. See INSULIN; URINE; ZOÖLOGY (How Zoölogy Affects Human Welfare). W.A.E.

DIAGONAL, *di ag' o nal*, SCALE, a scale consisting of a system of lines by means of which fractional parts of a unit of measurement may



DIAGONAL SCALE

be measured and laid down by compasses. In surveying or laying out maps or plotting land, this scale is of great assistance. The accompanying diagram explains how the scale is used. The space from *a* to *b* represents one inch, and the space from *a* to *c* is also one inch. The square inch contained within *a b* and *a c*

is divided into equal spaces by parallel lines. Each small space represents one-hundredth part of a square inch. One-hundredth part of a lineal inch is indicated by the line passing from *d* to *b* at the point where that line intersects the line *e f*. Two one-hundredths of an inch will be found at the intersecting point of the lines above, and so on. If it is required to measure one inch and two one-hundredths of an inch, place one point of the compass at the point marked 2. The other, being placed at the (.) on the scale, will indicate the two one-hundredths. Each vertical line indicates ten one-hundredths of an inch. See SURVEYING.

DIAGRAM OF SENTENCE. See SENTENCE, subhead.

DIAL, new form of, for watches and clocks. See CLOCK.

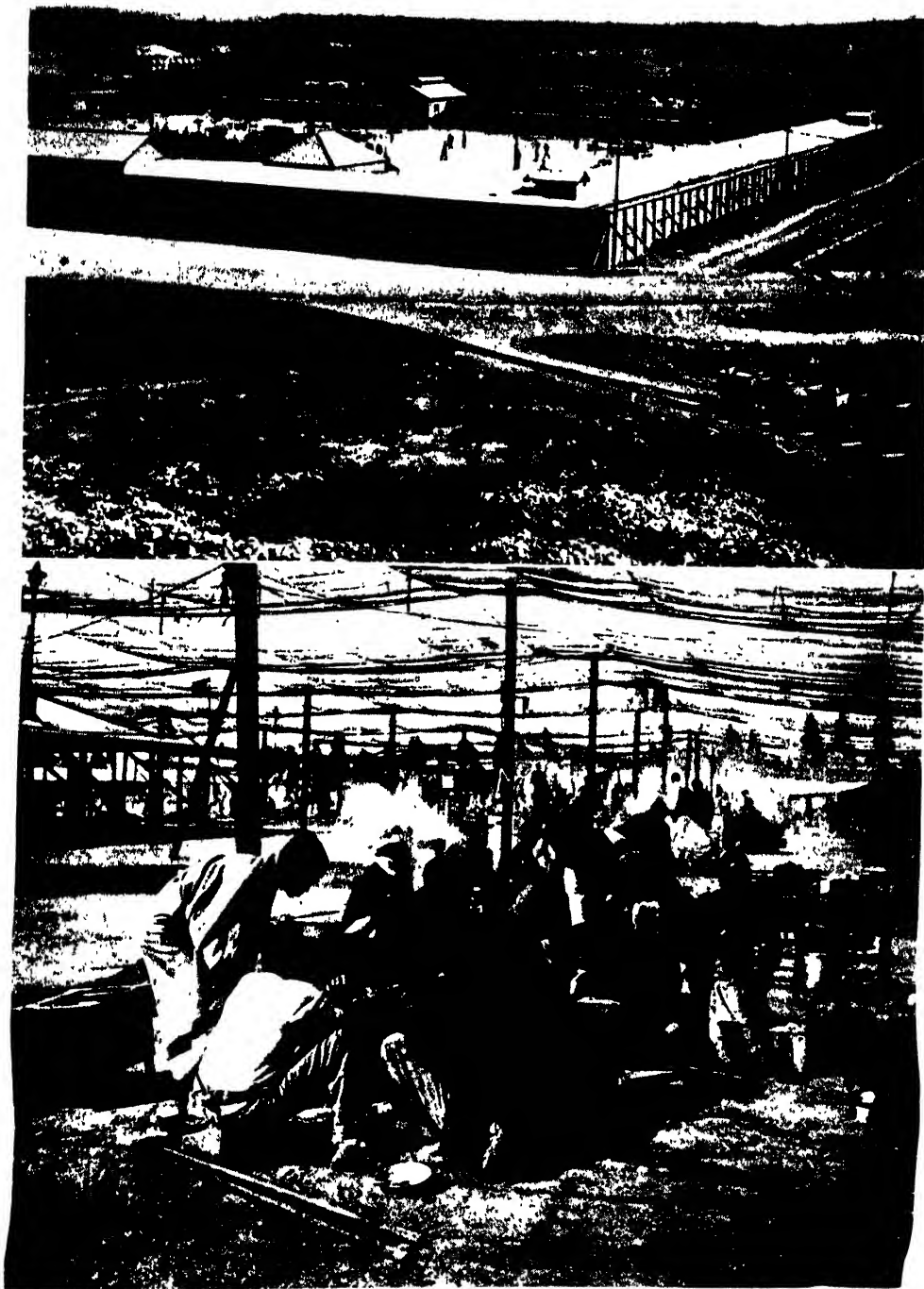
DIALECT, *di' a lekt*, a term used in several closely related senses, but most commonly taken to mean the idiomatic language of a certain district or class, differing from that of other districts or classes, or from the generally accepted, literary language (see IDIOM). In early days, before the establishment of easy means of communication and before the invention of printing, people of a certain locality in the course of years might so modify their language that other people, living but a few miles away and using what was originally the same language, could not understand them at all. This was once true in England, and is yet to some extent, although the adoption of a standard literary language has done much toward doing away with the differences, and has made them practically non-existent in the speech of well-educated Englishmen.

Just as Scottish is a dialect of the English language, so English is, or was, a dialect of the Germanic or Teutonic group of languages; but it has changed so radically through the centuries and established itself so firmly that it is never thought of as a dialect. Students of languages find much in the study of dialects which is enlightening, for often through the idioms of differing dialects derivations can be traced and resemblances can be discovered which could not be detected by an examination of a language in the more stable form.

Many fiction writers employ the dialect of the region with which their work deals, to give their stories "local color" and authority. The novels of Sir James Barrie and of Ian Maclaren are examples of the use of Scottish dialect. Characteristic dialect forms in North America are French-Canadian, negro, Hoosier, French Creole, and Yankee.

DIAMETER, *di am' e tur*. See CIRCLE; SPHERE.

DIAMOND, *di' a mund*. Bidding defiance to the ravages wrought by time and wear, the diamond holds a supreme place among the jewels, and because of its unconquerable hard-



Photos U & U

A Diamond Compound. View of a typical compound, and a scene within one, photographed when workmen were off duty.

1929

ness has become, figuratively, the emblem of fearlessness.

The diamond is not only the most popular stone for jewelry, but it is preëminently the gem of the engagement ring. For this purpose, the single stone, or solitaire, is most frequently purchased.

Origin. The exact conditions under which diamonds are formed in the earth have not yet been discovered. They were first found in gravel and sands in streams, and later were discovered deep in the earth. Mined diamonds are found in ancient volcanic vents, which seems to indicate that they have been violently blown out of the interior of the earth by volcanic action, or that they have formed under the conditions of cooling lava. Recently, scientists have discovered that by heating pure prepared carbon and iron to intense heat by electricity, then letting the mass cool suddenly, very small diamonds are formed at the center of the lump; this would seem to indicate the process of diamond formation—carbon subjected to great heat and the tremendous pressure of cooling. It has long been known that a beautiful diamond, if heated very hot in a vacuum, or place without air, expands or swells and becomes ordinary black charcoal. If subjected to intense heat while in the air, it disappears as carbonic acid gas.

Characteristics. Diamonds form in crystals (see CRYSTALLOGRAPHY). Some of the crystals have four sides, shaped like those of a cube; some have eight sides, forming a double pyramid; others have twelve faces, each face being a parallelogram, and there are various other forms. The great brilliance of the cut stone, which is not disclosed in the rough, is due to the power of the diamond to refract, or break up, light, and this power is very much enhanced by the little planes, or *facets*, of the cut. The stones cannot be dissolved or hurt by acids and can be made to glow in the dark by rubbing, or after having been in the sunlight or in the presence of radium. Some stones, when subjected to a current of electricity in a vacuum, glow wonderfully. As diamonds are the hardest material known, they can be cut and polished only by contact with other diamonds. They are weighed in carats (see CARAT).

Value. We sometimes confuse the meanings of the two words, *valuable* and *costly*. Diamonds are certainly among the most costly things in the world, partly because they are very rare. There is no reason why the diamond should be a rare stone, except from the fact that

those who own the fabulously rich mines purposely limit the output. The cost of producing diamonds in South Africa, for example, is only \$12 a carat, according to a report made to its stockholders by the syndicate which controls the supply. However, the output is restricted every year, to meet only the demand that continues at the high prices maintained. Because their value is thus established, diamonds are a safe

investment. One can nearly always sell them in time of emergency, without loss.

Diamond Cutting. In olden times, diamonds were cut in a very crude fashion. In the Dutch city of Bruges, in 1746, was established a trade guild of lapidaries, or stone cutters, under the master cutter, L. von Berquem. Other guilds were soon established in Antwerp and Amsterdam, and these cities, particularly the latter, have to this day retained preëminence in the art of diamond cutting. The tools used are simple, and practically everything depends upon the skill and knowledge of the artisan.

Uses of the Diamond. Because of its hardness,



A HANDFUL OF SPARKLING GEMS
Thirty thousand dollars' worth of De Beers diamonds, at mine prices



Photo. U & U

DIAMOND CUTTING AND GRINDING

The diamond is held in the clamped frame resting at the correct angle on the revolving disk. The disk is covered with olive oil and diamond dust, which does the cutting.

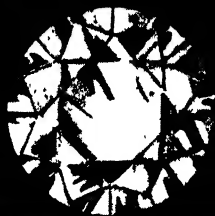
it is superior to any other material for cutting and drilling. Glass fitters use diamond



Goal of
the adventurer



Livelihood for
the worker



**WHAT'S IN
THIS BIT *of*
CARBON ?**



Fortune for
the merchant



Bauble for
the wealthy



Pledge
of
love



Indispensible
tool



Symbol
of royalty

points with which to cut their glass. Diamond dust, saved from the process of cutting, is used for fine polishing. The points of engraving



Photo U & U

BRINGING DIAMOND-BEARING ROCK FROM THE MINE

Huge steel buckets bring to the surface every day as many as 7,000 truckloads of diamondiferous blue earth. This is dumped in vast fields and spread out, and the air disintegrates it. After it is thoroughly dry, the diamonds are extracted.

ing tools for hard surfaces, such as glass and steel, are diamond points. Very small diamonds are used as bearings in watches, and on the points of gold pens; and larger ones are lenses in microscopes. On the end of stone drills, diamond points are invaluable because they stand great weight and great pressure. Carbonado, a form of diamond not suitable for gems, is more valuable on drills than the diamond itself, for it is slightly harder, is not so perfectly crystallized, therefore has less cleavage and is less likely to break. Diamonds in which are drilled tapering holes are used for wire drawing. A permanent, indestructible diamond needle is used in some varieties of talking machines. There are, besides, a few other technical mechanical uses of diamonds.

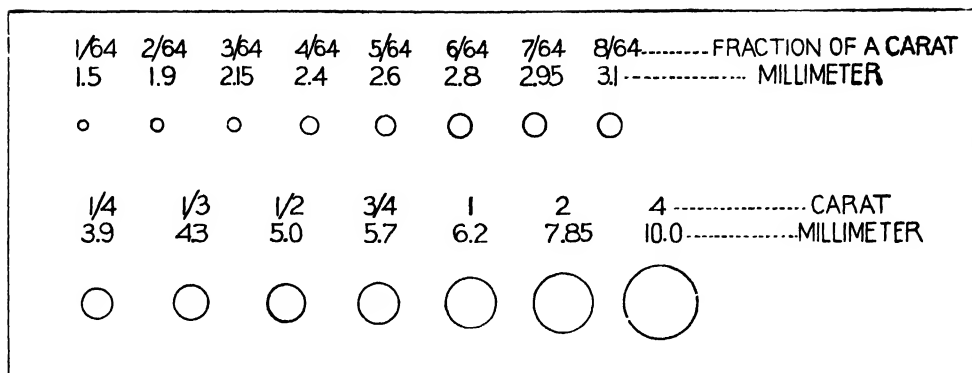
Diamond Fields. The most ancient gems are known to have come from India, where the industry of gathering these stones was first carried on. The natives of low caste were the workers in this field, and the methods employed were the most primitive. The stones were found in the gravel and the sands of streams and removed as are gold nuggets in placer mining, the fine gravel being washed away in sluices and the nuggets picked out from among the larger stones. Golconda was

the market for many of the Indian stones which have become known by that name. At the present time, no diamonds are exported from India, and many of the old mines are no longer worked. In Brazil, in 1721, valuable diamond fields were discovered whose stones excelled in quality those of India.

The largest yield of diamonds anywhere in the world has come from the Kimberley region in South Africa, although what is said to be the largest diamond field in the world was discovered in 1928 in the northwest part of Cape Colony, in South Africa. The story goes that in the year 1867 a traveler in South Africa paid a few pennies for a pretty pebble picked up from the bed of the Vaal stream by the children of a Boer farmer. This stone was afterwards sold in Paris for \$2,500, and eventually led to the discovery of the rich diamond fields of South Africa. These mines at present yield ninety-eight per cent of the total yearly product of diamonds, and the total value of the stones obtained since the opening of the mines has amounted to more than \$800,000,000. The stones are both washed from river gravel and mined out of the earth. The miners and their families live, voluntary prisoners, within great enclosures called "compounds," to reduce to a minimum the theft of valuable stones.

Diamonds have been found in the United States in Arkansas, California, in the Piedmont region of the eastern coast, and around the Great Lakes, but they have been mined only in Arkansas. They have also been found in small quantities in British Guiana, Russia, China, Sumatra, and Australia.

Famous Diamonds. Very large diamonds of rare quality are almost without exception the property of states and royal personages. The largest Golconda diamond, called the *Great Mogul*, was once in the possession of Shah Jehan, builder of the famous Taj Mahal (which see). The *Orloff*, a magnificent Russian crown jewel, bought by Prince Orloff for the Empress Catharine II, is said to have been stolen from the eye of an idol in a Brahman temple. From the first thief it was acquired by a second, and by him sold to the prince. The *Kohinoor*, now in possession of the royal family of England, was for many centuries handed down from one Indian prince to another. It was taken when the British invaded the Punjab, and presented by the East India Company to Queen Victoria in 1850. The *Regent*, or *Pitt*, diamond is an Indian gem, one of the most beautiful of the large stones, and is owned by France and exhibited in the Louvre. The most famous of the Brazilian stones is the *Star of the South*. Many valuations have been placed upon these wonderful gems, but there is no means of valuing them correctly; not one is listed at less than half a million dollars, though no



ACTUAL SIZE CHART FOR JUDGING STONES

offer of many times such a sum would probably be given the slightest consideration.

The largest stone ever discovered of which there is any record, three times the size of the largest then known, was found January 26, 1905, in the Premier mine of South Africa. In the rough, it weighed 3.025½ carats. It was called the *Cullinan* diamond, from the name of its finder, and was purchased by the Transvaal government and presented to King Edward VII of England. It was sent to Amsterdam to be cut, and was divided into nine large stones, two of them among the largest brilliants in existence, and into a number of small stones. See GEMS.

How to Judge Diamonds. Weight, purity, and color are three essential points to consider in buying a diamond. The accompanying diagram shows the weight in carats of diamonds from 1.5 to 10 millimeters in diameter. In regard to purity, these gems are subject to three kinds of flaws: the presence of foreign minerals, gas- or moisture-pores, and small fissures called *feathers*. Specks of coal and graphite are the most common flaws of the first class. These are known as *sand*, when they can be seen by the naked eye, and *dust*, when they are microscopic. Sometimes they appear in streaks or silky layers, and sometimes they form clouds that diminish the transparency of the stone and impair its color. Gas- or moisture-pores often give the interior of the stone a porous appearance, and they also give rise to clouding.

In purchasing a diamond, the buyer should always use a ten- or twenty-power microscope, to make sure that he is getting a stone as represented. Jewelers usually classify diamonds as first, second, or third *water*. In the first class are those which are colorless, and transparent, and without flaws of any kind; in the second class, those which are colorless, with small but unimportant defects, or faultless but with some traces of color; in the third, those which are distinctly colored, or colorless with serious faults. Stones of the first water may

be perfectly colorless or they may have a tinge of blue, and they are carried only by first-class jewelers. Second-class diamonds often show traces of yellow color, which may readily be seen when the stone is examined in the sunlight. T.B.J.

How to Test Diamonds. It is almost impossible for an inexperienced person to distinguish between a genuine diamond and a good imitation, simply by comparing them. A genuine stone will be uninjured if tested with a steel file, provided both objects are free from grease. The mark of an aluminum pencil can be rubbed off a real diamond; an imitation one will retain the mark. A small drop of water will keep its globular shape on the face of a clean diamond, and will spread on an imitation stone. One can see a genuine stone shining through water in a glass, but an imitation stone will be almost invisible. It is possible to crush an imitation stone by squeezing it between two silver dollars with the fingers; such a test leaves the genuine stone uninjured. A real diamond will resist hydrofluoric acid, but an imitation will dissolve in it, after a time. Finally, the facets on genuine stones are less regular than those on imitations. It is possible to make very minute artificial (but true) diamonds by suddenly chilling molten iron containing dissolved carbon.

DIAMOND CAVE. See ARKANSAS (The Land).

DIAMOND MOUNTAIN. See OREGON (The Land).

DIAMOND STATE, a popular name sometimes applied to Delaware. See DELAWARE (Other Items of Interest).

DIANA, *di an' a*, of the Romans, OR **ARTEMIS**, *ahr' te mis*, of the Greeks, in mythology the daughter of Jupiter and Leto (or Latona), and the twin sister of Apollo. She is best known as the goddess of hunting, and is most frequently represented with bow and arrows, a quiver on her shoulder, a crescent on her head, and attended by hounds. She was brave in warfare and merciless in anger. Diana was identified with the Isis of the Egyptians.

Temple of Diana, a magnificent edifice, probably completed about 400 B.C., in Ephesus,

Asia Minor, and dedicated to the worship of Diana as the goddess of fruitful nature. It was built of Parian marble, was of imposing dimensions and considered one of the wonders of the world. It occupied the site of many previous temples which had been destroyed, one of them by the Ephesian Herostatus in 356 B.C. In A.D. 262 it was sacked and burned by the Goths, but later was partially restored. Excavations made in 1867, and subsequently, disclosed the lost site of the temple and many interesting and important details regarding it.

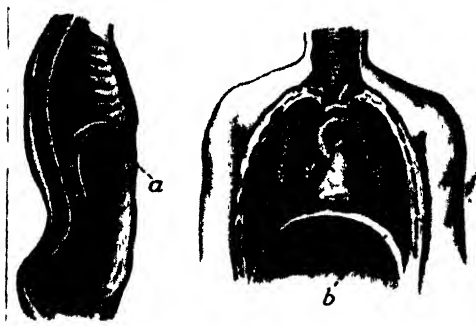


DIANA

Familiarly known as the "Diana of Versailles," because for many years it was in the Palace at Versailles. It is now in the Louvre, Paris. The statue is believed to have been the work of the sculptor Leocares, who lived in the fourth century B.C.

DIANA, TEMPLE OF. See SEVEN WONDERS OF THE WORLD.

DIAPHRAGM, di' a fram. The diaphragm is a large dome-shaped muscular organ which separates the thoracic and abdominal cavities. It is the chief organ of respiration. When one takes a breath, the diaphragm moves downward, increasing the vertical space in the thoracic cavity. At the same time that this movement occurs, the small muscles attached to the ribs cause them to expand outward, thus



TWO VIEWS OF THE DIAPHRAGM

(a) Vertical section of trunk, showing cavities of thorax and abdomen separated by the diaphragm; (b) the diaphragm is shown, front view.

increasing the lateral diameter of the chest. This increase in size of the chest cavity creates a negative pressure which pulls the lungs out-

ward and causes the inrush of air that we know as taking a breath. This is called *respiration*. Upon expiration, the diaphragm comes up toward the chest again, the ribs move inward, and air is forced out of the lungs. The nerve which supplies the stimuli to the diaphragm is known as the *phrenic* nerve. It extends from the neck through the thoracic cavity down to the diaphragm. Any irritation of this nerve will cause short spasmodic contractions of the diaphragm, known as *hiccoughs*.

In addition to its function as a respiratory organ, the diaphragm often acts as an organ of support. Thus, if a person wants to make a great effort to pull or lift a heavy object, he usually takes a deep breath and then holds his breath while he acts. When he does this, he is contracting his diaphragm so that it forms an extremely firm hard mass, and since the diaphragm is attached to the ribs, he is doing what is known as "fixing" the ribs; that is, he makes them immovable. This process is of value because many of the great muscles of the back and abdomen are attached in their upper limits to the ribs. If the ribs are firmly fixed, the muscles can pull against them with great force.

Mammals, or milk-giving animals, are the only organisms having complete diaphragms.

[The name is derived from a Greek word meaning to fence or enclose] K A E.

Related Subjects. In connection with this subject the following articles may be consulted.

Abdomen	Chest
Breath and Breathing	Hiccough

DIAS, de' ahsh, BARTHOLOMEU (? -1500), a Portuguese navigator, celebrated for his discovery of the Cape of Good Hope. In 1487, after several voyages to that part of Western Africa now known as the Gold Coast, he was placed in charge of an expedition to explore the African coast farther south. Being carried by the winds out of his course, he rounded the Cape of Good Hope without sighting it, and anchored in Mossel Bay, in Cape Colony. He was compelled to turn back by the complaints of his men, and on the return voyage he located Cape Agulhas, the southernmost point of Africa. A little later, he discovered Table Mountain and the cape, which he called the Cape of Storms; the king of Portugal changed the name to Cape of Good Hope. Dias perished in a storm which wrecked his vessel while he was returning from a voyage to Brazil. See GOOD HOPE.

DIASTASE, di' a stase. See BREWING.

DIASTOLIC, di' as tol' ik, PRESSURE. See BLOOD PRESSURE.

DIASTROPHISM, di as' tro fiz'm. See GEOLOGY (Earth Movements and Volcanoes).

DIATOM, di' a tahm, a microscopic, brown, one-celled plant belonging to the algae (see AL-

GAE), which grows in either salt or fresh water, and which has often been mistaken for a one-celled animal, because of its peculiar movement in the water. There are several thousand species. Some species grow as brown, slimy coatings on stones and piles in water; others grow attached to other algae; still others grow free-floating; the free-floating diatoms which grow in midocean are of great importance, since they serve as the food for small animal forms, which in turn are food for fish. The shells of the diatoms are composed of silica, which will not dissolve in water, and consequently, large masses are deposited at the bottom of seas, lakes, and ponds. At Lompoc, Calif., is a deposit 1,800 feet in thickness. Such deposits are used as polishing powder and as the absorbent of nitroglycerin in the manufacture of dynamite. They are also used in filters and as a heat-insulating material. G.M.S.

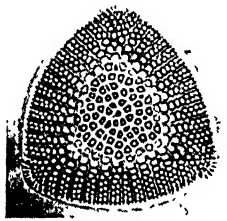


Photo: Visual Education Service

DIAIOM
Greatly enlarged.

DIAZ, de' ats. GENERAL ARMANDO, Italian World War hero. See ITALY (History: Italy and the World War).

DIAZ, de' ahz, PORFIRIO (1830-1915), a Mexican soldier and statesman, who after a lifetime in the service of his country, including more than thirty years as President of the republic, died an exile in a foreign land.

For a time he studied law, but at the outbreak of war with the United States, in 1846, he entered the army and began a military career which won him a reputation for skill and courage. He took a prominent part in the factional fights which disturbed Mexico after the war, and proved a most efficient leader of the patriots during Napoleon III's attempt to found an empire under French control.

After starting several revolts in an effort to secure the Presidency, he was elected to that office in 1877, through force of arms. He soon proved his exceptional ability, and when, during the Presidency of General Gonzalez, it proved that Diaz was the better man for



Photo: Brown Bros.

PORFIRIO DIAZ

Thirty years of peace and progress in Mexico ended with his exile to Spain in 1912.

the office, the Constitution was changed so that he might continue in office as long as his countrymen desired it. He won the confidence of his own people, and of those of foreign countries. Under his guidance, trade and industries were extended, the tariff law was revised, finances were improved, and important lines of railway were established.

Although there was occasional opposition to Diaz, it was not powerful enough for many years to accomplish his overthrow, for he ruled by the power of his army. In 1912, however, a revolution headed by General Madero resulted in the resignation of Diaz. He fled to Continental Europe, and from that point of safety followed with anguish the record his unhappy country made in the years of civil strife which started with the murder of Madero. He died in Paris. See MEXICO (History); MADERO, FRANCISCO.

DIBONG, di bahng', RIVER. See BRAHMAPUTRA RIVER.

DICE, cubes of ivory, bone, wood, or other material, used in gambling games continuously since their invention, about 1244 B.C. Dots



DICE

from one to six in number are placed on all six faces of the cube, so arranged that the total of any two opposite faces is always seven. The dice are usually thrown from a cylindrical box; however, they are sometimes shaken and tossed from the player's hand. The numbers showing on the top faces form the basis for deciding the game. The highest total of the numbers showing may win, or the dice may be used in the same manner that cards count in a poker hand. Dice games are regarded as such pernicious forms of gambling that they are forbidden by law in many parts of the United States and Canada. The particular objection to dice is that the gambling is based entirely on chance, allowing no considerations of skill. Frequently, dishonest players use "loaded dice," which have been weighted with lead so that "high" naturally falls uppermost.

DICENTRA, di sen' trah, a genus of flowering plants of the order *Fumariaceae*, which are widely distributed and highly ornamental, bearing heart-shaped flowers. Well known species are the *bleeding heart*, *squirrel corn*, and *Dutchman's breeches*. The bleeding heart, a native of Eastern Asia, introduced into Great Britain in 1846 from Japan (see BLEEDING HEART), is a favorite garden plant in the United States and Canada. The squirrel corn



Photo: Visual Education Service

DICKCISSEL

Male above; female near nest.

and Dutchman's breeches (which see) are among the early spring flowers in the Northern and Eastern United States.

The term *Dicentra* is derived from a Greek word

meaning two-pointed. The bleeding heart is *Dicentra spectabilis*; the squirrel corn, *D. canadensis*, and Dutchman's breeches, *D. cucullaria*.

DICHOTOMY, *di kol' o me*, in biology, signifies a division into two parts, or the distribution of things by pairs, or forks, as in the foot of a crab or the veins of fern leaves. The term is derived from a similar Greek word meaning a cutting in two. It is also used in astronomy, to describe that phase of the moon in which it appears bisected, or shows only one half of its disk.

DICKCISSEL, *dik sis' el*, a popular name for the black-throated bunting, in imitation of its loud, persistent call (see **BUNTING**). It is a handsome bird about six inches in length, with streaked grayish-brown plumage, varied by a yellow breast and bright chestnut wing-patches. There is a conspicuous black crescent on the throat. Dickcissels are common in the open regions of the Central United States, and are seen occasionally in Southern Ontario, but are strangely erratic in their distribution. They may be common in a given region for one or more years, and then disappear from that section entirely. Their favorite haunts are along railroads and roadsides, where, from bushes, weeds, and wires, they utter their plain song suggesting the syllables, "Dick, dick, dick, cis-cis-cis-cis," the last four notes uttered quite rapidly. The birds feed on insects, seeds, and gravel, and are worthy of protection. There are three to six pale-blue eggs, placed in a nest of leaves, grass, and hair.

D.L.

D

The STORY of

Dickens in 1841

CHARLES DICKENS

DICKENS, CHARLES (1812-1870), one of the greatest of English novelists. His works enjoyed in his own day a popularity unmatched in literary history, and they have continued to delight and charm millions of readers. He was a creator who brought into life almost countless characters as real as the people who walk the streets, and more real to the minds of his readers than the characters described by historians. He made his characters represent activities in the development of great and much-needed social, educational, and industrial reforms. Then, too, he possessed a genuine love for men, a grasp of the humorous and absurd, and a knowledge of life among the

lower classes which are certain to make him live long after more finished writers have lost their hold on the public.

Early Years. This man, whom royalty delighted to honor in his later years, had an unhappy and almost sordid youth. At his birth, on February 7, 1812, at Landport, Portsmouth, his family was in fairly easy circumstances; they remained so for a time after their removal to Chatham, and finally, in 1821, to London. But the "prodigal father," as Dickens called his parent years later, was a careless, happy-go-lucky man, who at length became so deeply in debt that he was sent to a debtors' prison, the Marshalsea, afterward made famous by

Dickens in *Little Dorrit*. Since a man in a debtors' prison might make himself very comfortable if he had a little ready money, it is probable that Charles' father had a better time than did Charles, who had been put to work in a blacking warehouse. All day he worked very hard and had but the scantiest food, but he could have borne all that had it not seemed to him that he had come to the end of his dreams of an education and a useful, busy life. For little Charles was very ambitious, and he had determined that somehow he was to become a great man. It was far from his thoughts that the very experiences he was going through, the very people he was meeting in his unattractive surroundings and storing up in his marvelous memory, would some day be the means of making him great.

After about a year, this wretched life came to an end and Dickens was able to go to school for two years, after which he entered a lawyer's office. In this position he was little more than an office boy, but he had time to study, and came into contact with people who saw that he was not an ordinary boy. In his spare hours he studied shorthand, and at the age of nineteen became a newspaper reporter in the House of Commons. A little later, he began to contribute to the *Monthly Magazine* and the *Evening Chronicle* those sketches of London life known as the *Sketches by Boz*. So popular were these that publishers bargained for a new series, and in 1836 *Pickwick Papers* began to appear in monthly numbers. It is difficult to realize the excitement which this loosely woven sketch, with its world-famous Sam Weller, aroused; and the great popularity they won for their author never declined through all the rest of Dickens' life. It was in 1836, too, that he was married to Miss Catherine Hogarth.

His Busy Years. With *Oliver Twist*, his next work, he introduced a new feature—that satire of institutions which actually accomplished results in more than one field. In *Oliver Twist* it was the abuses of the workhouse system that were exposed; in *Nicholas Nickleby*, the management of the cheap boarding schools; and that Dickens was not hitting beside the mark may be seen from the fact that more than one schoolmaster threatened to sue him for libel, believing himself the man caricatured in the coarse and brutal Squeers. Years later, *Bleak House* protested against the interminable suits in chancery, and *Little Dorrit* against the evils of the debtors' prison system.

Meanwhile, in the weekly "Master Humphrey's Clock," had appeared *The Old Curiosity Shop*, with its paragon of children, Little Nell, and its inimitable Dick Swiveller; and *Barnaby Rudge*, his only historical novel, with the exception of *A Tale of Two Cities*. This latter gives a vivid picture of the period of

the French Revolution, and the "knitting women" are not soon forgotten. Sidney Carton, the hero, is perhaps the most heroic of all



Photo. Brown Bros.

CHARLES DICKENS

Of his boyhood, one authority (Long) says that he was "a poor, obscure, and suffering child, helping to support a shiftless family by pasting labels on blacking bottles, sleeping under a counter like a homeless cat, and once a week timidly approaching the big prison where his father was confined for debt."

Dickens' characters, and the story as a whole is his most dramatic and artistic work. Dramatized as *The Only Way*, the *Tale* has been very popular. Other outstanding novels are *Martin Chuzzlewit*, which contains in overflowing measure Dickens' characteristic humor, but which for a time stirred up considerable feeling against him in America, because of its satire on life in "Eden"; *Dombey and Son*, beloved by many because of its pathetic little Paul Dombey, and admired by progressive thinkers because of its revelation of the evils of cramming in schools; *Hard Times*, a bitter attack on the heartlessness of capital toward labor, and a most complete criticism of adulthood for robbing children of a real childhood and for preventing the development of the imagination of each child; *Great Expectations*, Dickens' best-rounded work; *Our Mutual Friend*, and *David Copperfield*.

This last-named story was Dickens' favorite among his own works, and contained more that is autobiographical than all the rest together. Mr. Micawber is a sketch, exaggerated, but good-naturedly so, of Dickens' father, and the agonies of little David during his warehouse experiences are those of Dickens' self, remembered so keenly that they were a



Photo. Visual Education Service

THE "OLD CURIOSITY SHOP"

Interior view, as it appeared for many years.

pain to him all his life. One novel, *The Mystery of Edwin Drood*, he left unfinished at his death, and it is a curious fact that while in most of Dickens' stories he cannot keep a secret but reveals the windings of his plot at every turn, in this unfinished one he kept his secret so well that no one has ever been able to complete the tale satisfactorily.

During the latter years of his life, Dickens added to his immense popularity by giving readings from his own works, and his *Letters* describe most amusingly the crowds that flocked to hear him. All this was too much for his strength, however, and he died at the age of fifty-eight, at his home, Gadshill, near Rochester. Mourning for him was widespread, and the public which had loved him as though he had been a personal friend felt that he should be buried in Westminster Abbey, rather than at Rochester, as he had desired. Accordingly, he lies in the Poets' Corner there.

American Visits. The United States and Canada knew Dickens not only through his works but through several visits to America. The first was in 1842, and was turned by the enthusiastic people into a sort of triumphal progress. Everywhere great crowds awaited him, until he confessed himself hungry for solitude; everywhere he was feasted and flattered, and though his frankness on the subject of international copyright and his unfavorable comments on the country and its self-conscious republicanism, as written in *American Notes*

and *Martin Chuzzlewit*, later brought about much criticism of him, the American people enjoyed his work too much to hold a grudge. When he made his next visit, in 1867, every hall in which he gave his readings was packed to its capacity.

Influence on Education. Dickens never taught school, nor did he outline a system of education; he never wrote a learned book on "child-training" or "defects in modern education," yet educators of note declare him to have been an influence for good in the educational field. Not only did specific abuses yield to his attacks, but the general spirit of education in England and the very attitude toward the child changed slowly until they came more into accord with his ideas. Argumentative treatises were not in his line—he knew a better way to attack abuses. The evils of corporal punishment made a strong impression on him, for he had gone to school enough in his own young days to know what they were; so he wrote *Nicholas Nickleby* and drew in it a picture of monster Squeers, almost too vicious to be real, but too convincing not to be; he wrote *David Copperfield*, and let his readers feel the bite of Mr. Creakle's cane as he cut at the "chubby boys" whom he couldn't resist. These things and many, many more he described, with the result that thinking men all over the country began to wonder whether such abuses really existed, and if they did, to resolve that they must be corrected.

Created by the IMMORTAL DICKENS

Bill Sikes

Mr Micawber

Scrooge

Alfred Jingle

Little Nell and
her Grandfather

Mr Pickwick
and Mrs Bardell

Oliver Twist



Mr. Pickwick



Bill Sikes

DICKENS PROGRAMS

1

"No one thinks first of Dickens as a writer
He is at once, through his books, a friend"

Song, *The Ivy Green* . . . Dickens

Essay, *The Childhood of Dickens*

Mrs. Jarley's Wax Works, from

The Old Curiosity Shop

One child may represent Little
Nell, and act as showman.

Character sketch, *Little Nell*

Essay, *How Dickens' Novels Differ from*

Those of George Eliot

Reading, *A Child's Dream of a Star*

Essay, *What Dickens Thought of America*

Sources: *American Notes and Mar-*
tin Chuzzlewit

Dramatization, *Sam Weller Writes a*
Valentine

Characters: Sam Weller and his
father

2.

The chief work of Dickens was to lay bare
the injustice, the meanness, and the blighting
coercion practiced on helpless children. . . .
His was a noble work, and it was well done.

Hughes.

Dickens in Camp . . . Bret Harle

Essay, *How Dickens Advanced Education*

Dramatization, *David and Little Em'ly*

Scenes from *David Copperfield*

Essay, *How Dickens' Novels Differ from*
Those of Thackeray

Reading from *Dombey and Son*, conversa-
tion about the waves, between Paul
and Florence

Song, *What Are the Wild Waves Saying*

. *Carpenter*

Character sketch, *Paul Dombey*

Dramatization, *David Meets His Aunt*

Characters: David, Betsy Trot-
wood, Mr. Dick

Reading, *The Pickwick Club on the Ice*

To-day "not one blow in a thousand is given
to a child as compared with the time of Dickens'
childhood," and of this improved state of
things, Dickens was not only the prophet, but
in a large measure the promoter.

He saw other evils, too. That of "cramming"
struck him as particularly serious, and he
wrote with satire as biting as it was interest-
ing of the "mental green peas," "intellectual
asparagus," and "mathematical gooseberries"
that were "common at untimely seasons under
Doctor Blimber's cultivation." The unwhole-
some restraint of children, the systematic ignor-
ing of their individuality, the unsympathetic
attitude that was adopted toward them—all
these and more he attacked and at least partly
vanquished. Of course, not every school
had all these evils, but many of the private
institutions made them a regular part of their



GADSHILL

The home of Charles Dickens.

system, and parents as well as schoolmasters
were likely to fall into the error of looking
upon childhood as a troublesome time, which
must be undergone but which should be sternly
repressed, so far as possible. Gradually,
through his many books with their wide sale,
Dickens made more and more general his own
attitude toward children, which was one not
of toleration but of sympathy and alert in-
terest. Some of his ideas are commonplace
to-day, but in his time they were in advance
of the age, and the benefit which they conferred
on children it is impossible to estimate.

Summary. One cannot read the novels of
Dickens and make the acquaintance of their
wonderful characters—of Sam Weller and his
father, of Mrs. Gamp, Mr. Mantalini, Mr.
Toots, the Marchioness, and Dick Swiveller—
without realizing what a delightful companion
their creator must have been. To have taken
a walk with him about London must have been
an enlightening experience, for he possessed the
ability instantly to see absurdities, incongrui-

ties, queer sidelights on human characters, which another might miss, yet could not fail to appreciate, once they were pointed out. And it seems most natural to find that Dickens was deeply loved by his friends, to whom he in his turn was devoted. He took an intense interest in everything connected with the theater, and delighted to take part in private theatricals, either for his children's amusement, for charity, or for the pure pleasure of doing a thing which he did very well. His dramatic ability was so pronounced that an old attendant at one of the theaters once said to him, "Oh, Mr. Dickens, if it hadn't been for them books, what an actor you would have made!"

For a time, about twenty years after his death, Dickens was somewhat underrated, and there are not lacking to-day those who think that his books will some day be so "out of date" that they will lose their popularity; but the weight of opinion is all on the other side. Most authorities hold that Dickens' fame will increase rather than diminish, and there are some who do not hesitate to declare that in generations to come he will stand out as the greatest creative genius that England has produced. Count Tolstoi strongly held to this view. He kept but one picture on the wall in his room, and that was a portrait of Dickens. It is a fact that his books are still selling in great numbers. J.L.H.

DICKENS, FRANCIS, son of Charles Dickens, was connected with the development of Canada, for he was for several years an inspector in the Royal Northwest Mounted Police, later known as the Royal Canadian Mounted Police (which see).

DICKINSON COLLEGE. See PENNSYLVANIA (Education).

DICKSON CITY, PA. See PENNSYLVANIA (back of map).

DICOTYLEDON, *di kaht e le' dun*. See COTYLEDON, subhead; SEEDS; STEM; BOTANY (Classification).

DICOTYLEDONOUS PLANTS. See SEEDS.

DICTAPHONE, *dik' tu fone*, the principle of the phonograph applied to a time-saving device for offices, which is used for taking and transcribing dictation. The person dictating speaks into the mouthpiece of a machine which records his voice on a wax cylinder, in the same way that phonograph records are made. The cylinder is then placed in a transcribing machine, which reproduces the voice; a typist hears it through special receivers worn over the ears, and types it directly in finished form. A cylinder may be used many times, by shaving the engraved waxed surface, in a machine made for that purpose.

In offices where there is a large amount of dictating to be done, the dictaphone affords several advantages. It saves time, because

one person can dictate without requiring the services of a stenographer. It eliminates mistakes, because the dictated matter is placed on record and can be checked for accuracy. The rate of dictation is unlimited, because the machine will record the material at any desired speed. It is also valuable for recording memoranda of a statistical nature and instructions received by telephone or verbally. These can be recorded more rapidly than one could write them.

The dictaphone has come into wide use, and is a valuable addition to modern office equipment.

DICTATOR, *dik' ta tur*, a magistrate of the Roman republic who was elected only in case of great national emergency, and to whom supreme power was given. He could hold office for six months, but was eligible to reelection if the emergency still existed. When it was found necessary to place a man at the head of affairs, the Senate appointed one consul to make the selection. The dictator had power of life and death, without appeal to the people or the Senate, but could not leave Italy, and had no control over the treasury. Julius Caesar was on three occasions appointed dictator, the last appointment being for life. Cincinnatus left his plough to become dictator, returning to his farm when he had saved the republic. In 82 B.C. Sulla was elected to the office, and contrived to get himself reelected again and again, holding the office for three years. After the death of Caesar, the office was abolished. See CINCINNATUS.

DICTIONARY, *dik' shun a rie*. As commonly used, this word is applied to a book which contains in alphabetical order all or a part of the words of a language, with definitions, pronunciation, and examples showing their use, and with frequent illustrations. To a grown person, it seems a very simple matter to find a word in a dictionary, but it is not a faculty which comes naturally to children; often the use of a dictionary is one of the difficult things which a teacher must teach. Boys and girls have ability to use correctly only a few hundred words, while their fathers and mothers may not have a vocabulary exceeding 2,000 words. Therefore a dictionary, which may define from 100,000 to 500,000 words, is a necessity in every household.

Children should be able, before they leave the fifth grade, to look up a word quickly, to discover its pronunciation, and to pick out its various meanings; this they can best accomplish in some of the smaller, more simple dictionaries. But the older children should be taught to use a complete, or unabridged, dictionary and to appreciate the wealth of information to be found there. The difference in the amount of knowledge which two people can glean from a given paragraph in a dictionary

may be very enlightening. One will find only the meaning of the word sought, and perhaps not the very best meaning for his purpose; another will discover fact upon fact—word forms, obscure or old meanings, apt quotations, and a tracing of derivations which is a veritable word-romance. There is given herewith an illustration, explaining all that is said in a certain standard dictionary about a common word; and by means of guide letters, the varied character of the information is pointed out. Some words call for less explanation and illustration, and some for far more; this is a fair average.

The large school or library dictionaries also contain much other matter besides word definitions. Lists of geographical and biological terms, with brief explanations; much-used terms from foreign languages; national flags, state seals—all these and more may be found in the various appendices. The pictures are inserted to make the text clearer and should not be neglected. A dictionary is no longer confined to the compilation of the ordinary words of a language, but it also describes technical and specialized words; we have medical, biological, geographical, musical, and other dictionaries.

History of Dictionaries. The dictionary is far from being a modern invention, for the Assyrians had one of their language over 2,500 years ago, pressed in cuneiform characters on clay tablets (see CUNEIFORM INSCRIPTIONS). The Arabians, the Greeks, and the Romans, too, compiled dictionaries; they did not make any

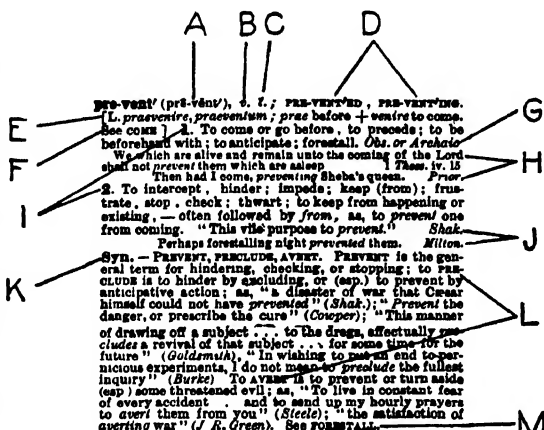
attempt at giving all the words of a language, but contented themselves with listing rare or difficult words. During the Middle Ages, when an ever-growing interest in Greek and Latin literature was felt, there arose the need for

lexicons—dictionaries which define the words of one language in terms of another—and with the increased intercourse between peoples this need has become even stronger. Today, there are lexicons which make almost every language on the globe, and many dialects, available to English students.

Of English dictionaries which aimed at completeness, the first was that of Nathan Bailey, published in 1721 and called the *Universal Etymological English Dictionary*. The English dictionary of Samuel Johnson, published in 1755, marked an epoch in the history of the English language and created a stir which it is difficult for the present age, rich in dictionaries, to understand. A dictionary is the last place in which one would expect to find humor, yet Johnson introduced it, consciously or unconsciously, into his. Oats, for instance, he declared to be "a grain which in Scotland forms the main subsistence of

the people, but which in England is fed to horses." It was Johnson who introduced the practice, now well-nigh universal, of illustrating the use of words by quotations from various authors.

Other dictionaries of the English language are that of Noah Webster, published in America in 1828, revised frequently and extensively,



GETTING INFORMATION FROM A DICTIONARY

- A. The dictionary gives the pronunciation of a word. Almost always a list of well-known words is given at the bottom of the page to make clear the method of marking pronunciation.
- B. It tells the part of speech of the word.
- C. In the case of a verb, the dictionary tells whether it is transitive or intransitive—that is, whether it may or may not take an object.
- D. It gives the principal parts.
- E. It indicates the language and the word or words from which the word under discussion is derived. For added clearness, it shows the makeup of the source word.
- F. It refers to other words which are related in meaning.
- G. If certain meanings of the word have passed or are passing out of use, the dictionary makes clear that fact by the use of the abbreviation *Obs.* (*Obsolete*) or the word *Archaic*.
- H. In some cases it gives quotations from well-known sources to show in what period the word was in use in its now obsolete sense.
- I. It lists the various meanings of a word under different numbers.
- J. It illustrates the correct method of using a word by showing how some writer of good English has employed it.
- K. It gives a list of synonyms—that is, of words which mean the same or nearly the same.
- L. By means of further definitions and carefully chosen illustrations, it points out just the shades of difference between these similar words.
- M. It refers to other words under which related information is given.

[The reader can pass many profitable hours investigating the wealth of material on the English language that can be found in a complete dictionary.]

and still, as *The New International Dictionary*, a standard work containing over 400,000 defined words; Worcester's *Dictionary of the English Language*; *The Standard Dictionary*; and *The Century Dictionary*; the last-named is a combination, to a certain extent, of dictionary and encyclopedic features. Perhaps the greatest of all modern dictionaries is one that was begun in 1884 and completed in 1928. This is known as the *Oxford Dictionary*; it is published at Oxford University. Its quotations are unusually full and illuminating, and are arranged chronologically, while its study of word-history traces every word through all its changes and modifications. About 500,000 definitions and 1,827,306 quotations are given. See LANGUAGE.

Derivation. The word *dictionary* is derived from a Latin term meaning *word*.

DICTOGRAPH, *dik' to graf*, an instrument made on the same principle as the telephone, but with an attachment that greatly increases the volume of sound at the receiving end. It has been extensively used as a means of detecting or preventing crime. It is so small as to be inconspicuous, and can be installed in a room without anyone's being aware of its presence. The fine connecting wires may be carried to any desired place, and a person stationed at the receiver can hear conversation, even loud whispers, carried on in the room containing the transmitter. The principle of the phonograph has also been applied to this device, and such conversation may be transmitted, not to the ear of a listener, but to a recording machine, which will preserve the recorded words until their evidence is needed.

The dictograph is occasionally used by newspaper men to hear the discussions in political conferences and other meetings which are not open to the general public. It figures frequently in fiction as an aid to detectives and police officials. In this capacity, it is an instrument for disclosing matters which might otherwise be very difficult of detection.

DIDACTIC APPARATUS. See MONTESORI METHOD.

DIDACTIC, *di dak' tik*, **POETRY**, that kind of verse produced by a poet when his chief object is to instruct or impart information.

The *Georgics* of Vergil and Horace's *Art of Poetry* are classic examples of didactic poetry, the former being an account of agriculture and kindred arts, and the latter a discussion of the principles of poetry. Pope's *Essay on Criticism* and his *Essay on Man* are among the best-known didactic poems in English literature. The familiar couplet which follows is an admirable illustration of this type of verse:

Know then thyself, presume not God to scan;
The proper study of mankind is man.

Longfellow's *A Psalm of Life* may be considered an example of a short didactic poem.

The exact nature and purpose of poetry is a matter of dispute. Some critics, those of the Edgar Allan Poe class, tell us that the function of poetry is to give pleasure, and that Pope's *Essay on Man* cannot properly be called poetry. A medium ground is taken by those who claim that the highest forms of poetry teach important lessons of life without being purposely didactic. Milton's *Paradise Lost*, Goethe's *Faust*, and Shakespeare's dramas all contain valuable ethical teachings, but these spring from the very heart of the masterpieces, which are in no sense examples of didactic verse. See POETRY.

DI'DO, OR **ELISSA**, founder and queen of Carthage, was the daughter of a king of Tyre, called variously Belus, Agenor, and Mutgo. She



AENEAS AT THE COURT OF DIDO
From the painting by Guérin.

was the wife of Acerbas. Her brother Pygmalion, coveting her husband's possessions, murdered him. Dido, concealing her wealth, and accompanied by many devoted people of Tyre, fled to Africa. She landed near Utica, a colony of Tyre, where she was promised as much land as might lie within the boundaries of a bull's hide. Cutting a hide into many thin strips, she pieced them together, and thus secured an extensive territory. Here she built Carthage. Iarbas, a neighboring prince, wished to marry her, threatening war if she refused. Hating and fearing him, she erected a funeral pile, threw herself upon it, and stabbed herself in the presence of her subjects. Vergil gives a different version of this episode, attributing Dido's suicide to her love for and abandonment by Aeneas, a Trojan hero. Dido was worshiped in Carthage as a goddess.

Related Subjects. The reader is referred in these volumes to the following articles:

Aeneid Carthage Tyre Utica

DIDYMUS, *did' e mus*. See APOSTLES (Thomas).

DIE, a tool used for stamping metals and leather. The design to be stamped is engraved on the die, which is usually made of high-quality steel. Coins are stamped on both sides at once by the use of two dies. Some dies are made for use by hand, but machinery is generally employed for stamping metals.

Die Sinking. The making of dies, called die sinking, is an industry requiring great skill. The die sinker first makes a pencil tracing of the design he is to reproduce. The surface of the metal employed is coated with white paste, on which the tracing of the design is pressed. Gentle rubbing of the back of the tracing causes the lines to be transferred to the surface of the metal. The lines are then cut to the required depth with sharp steel tools. From the original die, which is hardened and tempered, any number of copies may be made by stamping or punching in a softer metal, which is then hardened for use.

DIELECTRIC, *di e lek' trik*, the name generally given a nonconductor of electricity, such as the glass between the outside and inside coatings of a Leyden jar. In other words, a dielectric is an *insulator*; the term is particularly applied to a nonconductor placed between two good conductors of electricity. In the practical use of electricity, mica and paraffin paper are extensively used as non-conductors. See **ELECTRICITY**; **INSULATOR**; **LEYDEN JAR**. H.S.E.

DIESEL, *de' zel*, **ENGINE**, an oil-burning, internal-combustion engine designed by the German scientist, Rudolph Diesel, and first constructed in 1893. It is similar in structure to the gas engine (which see), but is distinguished by the fact that the fuel is ignited by the heat of compression in the cylinder instead of an electric spark.

As in gas engines, there are both four-cycle and two-cycle types. In both, air is compressed in the end of the cylinder by a stroke of the piston, sometimes to a pressure of 500 lbs. per square inch and a temperature of 1,000° F. Oil spray forced into this compressed air is vaporized by the heat and then ignited, and the resulting gases force the piston out. On its return to complete the cycle, the waste gases are released.

The first Diesel engines were heavy, required expensive compression plants for forcing in the oil spray, and specially skilled workmanship, thus limiting their use. Adaptations were made, however, and they are now used extensively in city power plants and waterworks, and in ships weighing as much as 20,000 tons; a mammoth German vessel, the *Bremen*, uses Diesels.

A Diesel engine gives nearly twice the thermal efficiency of a steam engine, with a saving in space, personnel, and fuel; on the other hand, in ships it is more costly to in-

stall, repair, and maintain. The recent development of smaller, light-weight Diesels of smaller horse power has made them available and immensely useful for yachts and light cruisers, and for dredges, power shovels, etc. Their practicability for motorizing airplanes seems to be assured, for experiments with them in such capacity have been encouraging.

DIET. Whatever a person eats regularly, day by day, constitutes his diet. In the French, Latin, and Greek languages, the corresponding word means *manner of living*, but in the English language it is limited to one item of living, namely, food. Just what selection of foods is the best for health is a subject which interests nearly everybody. The problem of gratifying the appetite and receiving proper nourishment, and at the same time maintaining a desired weight, is also one of acute interest to large numbers of people. At various times there has been agitation for a curtailment of this and that food, for fads in the diet are quite as prevalent as in music, amusements, or dress. The consensus of authorities who have studied the problem thoroughly is that the healthy person needs a balanced diet in which a considerable variety of nourishing food has a place. There are those who believe that a vegetarian diet best maintains health, but the modern idea is that meat and meat products should be included in the diet of the person whose digestion functions normally. What should be guarded against is the immoderate use of these foods; however, it is just as unwise to be intemperate in eating any other kinds of food. Reduction in weight is most reasonably effected by reducing the customary amount of food eaten.

The healthy person needs enough protein to build living tissues and offset the wearing out of the body cells; he needs sufficient fat and carbohydrates to furnish heat and energy; he must have water to replace the fluids excreted by the lungs, skin, and kidneys; and he requires mineral substances and vitamins. The properly balanced diet furnishes these substances in the right amounts. Persons suffering from diabetes, kidney disease, stomach disorders, or any other condition aggravated by wrong food habits, must have special diets to suit their particular requirements. Sugar, which the healthy body needs, is poison for the diabetic. There are certain deficiency diseases, such as scurvy and rickets, which are corrected by the addition of special nutritive elements to the diet. The branch of hygiene and medicine that treats of diets in their relation to health and disease is called *dietics*. E.V.M'C.

Related Subjects. Classifications of foods, tables showing composition and fuel value, and many other items relative to the subject will be found in the articles listed on the next page.

Calorie
Carbohydrates
Cookery
Digestion
Fasts and Fasting
Fat
Food
Health Habits

Life Extension
Mastication
Metabolism
Nutrition
Obesity
Proteins
Vegetarianism
Vitamins

DIET TO INCREASE WEIGHT. See OBESITY.

DIET TO REDUCE WEIGHT. See OBESITY.

DIET, the name applied to the Hungarian Parliament, and formerly to the legislative assemblies of German states and Austrian provinces. In the days of the Holy Roman Empire, the name was given to the imperial Parliament. The word also refers to a formal public assembly, and was long applied in Europe to religious assemblies for special purposes. In 1521 Martin Luther (which see) was brought before the Diet of Worms for inquiry into what were considered his heretical views.

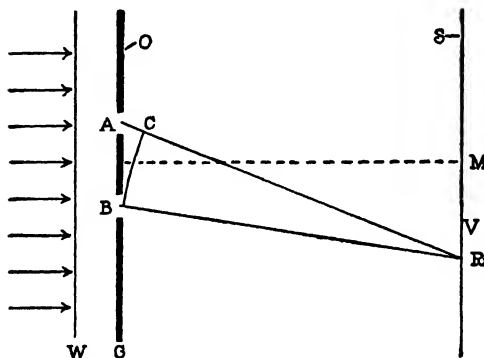
DIETETICS. See DIET.

DIFFRACTION, *dih frak' shun*. Diffraction is the spreading out of waves as they pass an obstacle or through an aperture. Really an aperture is merely a space bounded by an obstacle on each side. In simple language, the edges of waves bend around corners. We are familiar with this fact, for we have heard persons shout when they were on the other side of a building from ourselves. We have seen water waves spreading out in every direction when passing through an opening in a breakwater. Sound and water waves are diffracted, therefore why not light waves? The answer is that light waves are diffracted, and just as much as are sound waves, in comparison with their size. A bicycle ball compared with the length of a light wave is larger than a house, or even a mountain, compared with a sound wave. We can detect diffraction of light if we use small objects and small and distant sources of light.

Suspend a bicycle ball with a thin wire or thread a few feet in front of a piece of white paper, so that a small and distant source of light (say, an arc lamp) will cast a shadow of the ball on the paper. There will be a small white spot in the very center of the shadow. It is called the Arago white spot, because it was discovered by Arago. It is caused by the diffraction of the light waves as they pass the edge of the ball. The center of the shadow being equidistant from all parts of the edge of the ball, the diffracted light waves arrive there at the same time (in the same phase) and unite to produce light. To get to other parts of the shadow, the diffracted waves would have different distances to travel, some getting behind the others and interfering destructively with them.

Diffraction Grating; Diffraction Spectrum. A diffraction spectrum is one that is formed by a diffraction grating. A diffraction grating (transmission grating) is a piece of glass having its surface ruled with a very large number of parallel and equidistant scratches, usually thousands of lines to the inch. White light passing through such a grating is broken up into its constituent colors, forming a spectrum similar in appearance to the spectrum formed by a prism.

The complete theory of the grating is too complicated to be given here. However, some idea of the principles involved may be obtained by a study of the accompanying figure, in which an advancing light wave W strikes a grating G with only two apertures, A



and B , through which the light can pass and fall on the screen S . As the light passes through the openings it is diffracted in every direction. Consider what happens at the screen S , say at the point R . Light reaches R from the aperture A along the path AR , and from B along BR . With R as center, draw the arc BC . The light from A must travel a distance AC farther than the light from B must travel. It therefore gets the distance AC behind. But if AC is a whole wave length for red light, the two sets of waves arriving at R will still be in the same phase; that is, they will unite to produce red light at R . But when AC is a whole wave length for light of one color, it cannot be for a wave length of a different color. So the different colors will be produced at different points on the screen. This band of colors is called the *diffraction spectrum*. It is sometimes called a *normal spectrum*, because the position of the colors does not depend on the kind of glass, as does the prismatic spectrum. A.L.F.

DIFFUSION, *dih fu' zhun*, is the mixing of the molecules of one substance among those of another. All substances, whether liquid, gaseous, or solid, are composed of molecules in a constant state of motion. Liquids and gases, whose molecules are easily displaced, provide the most familiar illustrations of diffusion. A small quantity of red ink, injected through a tube to the bottom of a glass jar two-thirds full of water, will soon impart a red color to the water. A bottle of smelling salts, uncorked in a room, will soon dissipate its odor through the room; by a similar process the fragrance of flowers scents the air in a conservatory. In these cases, the molecules of gas that give rise

to the odors are scattered through the air and mingle, or diffuse, with the molecules of the air gases. It is diffusion that causes the different gases in the atmosphere to form a uniform mixture, instead of arranging themselves in layers.

Ammonia water is an example of the diffusion of a liquid and a gas, that is, water and ammonia gas. The sweetening of a cup of coffee by a lump of sugar is an illustration of the diffusion of a solid in solution with a liquid. The molecules of sugar, as the substance melts, mix with the molecules of coffee and sweeten it.

In the plant world, we have an example of diffusion in the transfusion of sap through the cell walls (see OSMOSIS). A.L.F.

DIGESTION, *di jes' chun*. The food which is taken into the mouth, however well cooked and palatable, is not in such condition that it may be absorbed at once by the blood and used to nourish the body. Various changes must take place, some in the mouth, some in the stomach, and some in the intestines. The process by which these changes are brought about is known as *digestion*.

The Mouth.

Digestion begins in the mouth, where the food is ground into fine particles by mastication and mingled with *saliva*, which moistens it and changes some of the starch to *mallose*, a form of sugar. Thus, thorough mastication serves a two-fold purpose; it mixes saliva with the food, and grinds the latter so the fluids of the stomach and intestines can more readily act upon it. When mastication is not thorough there may result *indigestion*, or failure of digestion.

The Stomach. The masticated food passes down the oesophagus into the stomach, where further changes take place. The gastric juice is mingled with the food by a peculiar churn-

ing motion, caused by the contraction of the muscles of the stomach. The gastric juice starts the digestion of the *proteins*, or nitrogen-bearing foods, such as eggs, lean meat, and milk. A ferment called *rennin* curdles the milk and aids in its digestion. The starches, sugars, and fats are not changed by the gastric juice. The time required for digestion in the stomach varies from two or three to four or five hours, according to the nature of the food. The partially digested food, known as *chyme*, passes on into the intestines.

The Small Intestine. The partly digested food is further acted upon in the small intestine by the pancreatic juice, the intestinal juice (*succus entericus*), and the bile. The pancreatic juice changes starch into sugar and proteids into peptones, and attacks fats. Though having milder effects than the pancreatic juice, the intestinal juice acts in much the same way on food.

Bile takes a part in the dissolving of fat, forming soap with fatty acids. It also checks putrefaction. When all of these juices have done their work, the food is of milklike appearance, has an alkaline reaction, and is of thinner consistency than chyme. It is now ready to be absorbed by the capillary blood vessels and lymphatics (lacteals) of the small intestine and to be carried into the circulation for the nourishment of the body. Some slight digestion takes place in the large intestine, but this part of the digestive tract is principally a storage place for waste matter. The waste material that accumulates here is roughage that cannot be digested. It is expelled at intervals from the body. It is in this portion of the tract that the body absorbs most of the water taken with the food. The complete story of the disposal of digested food products is told in these volumes under **METABOLISM**. K.A.E.

Related Subjects. The following articles in these volumes bear a more or less close relation to the topic of digestion.

Alimentary Canal	Lymph
Bile	Mastication
Blood	Metabolism
Carbohydrates	Mouth
Chyle	Nutrition
Chyme	Pancreas
Fat	Peptones
Food (Digestibility of Food)	Proteins
Health Habits	Saliva
Intestine	Starch
Liver	Stomach
Lacteals	Sugar
	Taste

DIGESTIBILITY OF FOOD. See **Food**, subhead.

DIGGERS. See **INDIANS** (Shoshone).

DIGIT, *dij' i*, a word derived from the Latin *digitus*, meaning a *finger*. It is now applied to any one of the ten numerals from 0 to 9. A number of three figures, such as 134, is said to consist of three digits. See **ARITHMETIC**.



CHANNEL OF DIGESTION

Below the mouth, the processes of digestion are related to the following organs:

- (a) Stomach
- (b) Duodenum
- (c) Small intestine
- (d) Termination of the ileum
- (e) Vermiform appendix (now obsolete)
- (f) Ascending colon
- (g) Transverse colon
- (h) Descending colon

In astronomy, a digit is one-twelfth of the diameter of the sun or moon. In the measurement of an eclipse, if eight of the twelve divisions of the surface are covered, it is spoken of as an eclipse of eight digits. See NOTATION.

J.W.Y.

DIGITALIS, *dij i ta' lis*, a powerful drug obtained from the dried leaves of the purple foxglove (see FOXGLOVE). It is invaluable in the treatment of certain kinds of heart disease. When the muscular action of the heart is so weak that the organ cannot contract sufficiently to force the blood out, digitalis overcomes this weakness, and also keeps the heart from expanding too much. This drug is too powerful to take except in doses prescribed carefully by a competent physician. Overdoses produce nausea and vomiting, diarrhea, prostration, and irregularities of heart action. Digitalis is used in powder, in pills, as an infusion, and as a tincture.



Photo Visual Education Service

DIGITALIS

DIHONG, *de' hong*, **RIVER**. See BRAHMAPUTRA RIVER.

DIJON, *de zhon'*. See FRANCE (Interesting Cities).

DIKE, in geology, a mass of rock resembling a wall, enclosed by other rock. Often in the formation of the earth's crust, molten rock from beneath penetrated fissures in older rocks, either by forcing open cracks or by melting its way into the other rocks, and solidified in the fissures, forming *dikes*. These range in thickness from a fraction of an inch to more than 500 feet, and in length from a few feet to many miles. Some dikes have nearly parallel smooth walls, others are irregular, and some have branches. Dikes that penetrate stratified rocks along bedding planes are called *sills*. A very few dikes are not formed of igneous rock, but of sand or other fragmental material that was forced into fissures and there hardened. No sharp distinction can be made between dikes and veins, but as a rule, the material of dikes was intruded all at once, and that of veins was accumulated gradually by deposition from circulating water or vapor.

The rock of some dikes is harder, and in outcrops weathers less rapidly, than the enclosing rock, above which the dikes stand like walls, hence their name. That of other dikes, however, weathers more rapidly than the enclosing rock, leaving trenchlike depressions across the

surface. In sea cliffs such dikes may be eroded out by the waves, forming deep, narrow chasms. See VEIN; IGNEOUS ROCKS.

L.LaF.

In *engineering*, artificial embankments for the purpose of keeping a river in its channel or to protect lowlands from the sea are also called dikes. Holland has been reclaimed from the sea almost entirely by dikes, without which the North Sea would inundate the country (see NETHERLANDS, THE).

DIK-DIK, one of the smallest of antelopes, ranging in East Africa from Ethiopia to Tanganyiki. This animal differs from other antelopes by the presence of a tuft of hair on the crown and by a slightly longer muzzle than is common to other species.

DILL, a pickle. See PICKLE.

DILLON, JOHN (1851-1927), an Irish agitator and politician, from 1896 to 1899 the recognized leader of the Irish Nationalists. He was born and educated in Dublin, and entered Parliament as a member for Tipperary in 1880. He was twice imprisoned for inciting the Irish peasantry to violence, but stoutly held to his plans for freeing Ireland from English domination. Ill health caused him to remain out of Parliament for a few years, but he was re-elected in 1885, and was returned continuously for many years. In 1918 he headed the Irish Nationalist party, bitterly opposed what he termed Britain's coercion, and lived to see the organization of the Irish Free State.

DIMETER, *dim' e tur*. See METER.

DIMITY, *dim' i tie*, a fine sheer cotton fabric with raised cords, woven in the loom and arranged in stripes or crossbars. It is used for women's and children's dresses and for curtains and covers in bedrooms.

DIMINUENDO, *dih min u en' doh*. See MUSIC (A Course of Lessons).

DINARIC, *di nair' ik*, **ALPS**. See YUGOSLAVIA (Physical Features).

DINARIUS. See DENARIUS; PENNY.

DINE, a name of the Navaho Indians. See INDIANS (Navaho).

DINERO, *de na' ro*, a standard coin of Peru. See MONEY (Foreign Monetary Standards).

DING, DONG, BELL. See LANGUAGE.

DINGLEY BILL, a tariff measure. See MCKINLEY, WILLIAM (Administration).

DINGO, *ding' go*, the name for the wild dog of Australia, remarkable as the only dog that exists both wild and domesticated in the same country. These wild dogs hunt in packs and are sometimes very destructive to herds of sheep, and on this account are fast being exterminated. In color, the dingo ranges from tawny to almost black. It stands two feet high; its body is about two and one-half feet long, its hair is rough and coarse, and the tail is long and bushy. In its wild state, the dingo does not bark, its cry being a wolflike howl, but when associated with domestic dogs, it



Photo Wide World

SKELETON OF A BRONTOSAURUS

Bones of this great skeleton, photographed as they were being removed from their resting place during uncounted centuries, in Eastern Utah. The brontosaurus was one of the largest of the dinosaurs. The skeleton is now in Salt Lake City. See FOSSIL.

learns to bark. If captured as a puppy and well treated, a dingo makes a faithful and affectionate companion, and will valiantly defend its master's sheep against the attacks of its wild relatives. See DOG. M.J.H.

DINIZULA, *din i zoo' lah*, the last Zulu king. See ZULULAND.

DINOSAURIA, *di no saw' rih ah*, the name of a group of extinct reptiles, whose footprints have been found in rocks of great age. Fossil bones of these creatures have been unearthed in all continents, but are especially numerous in the semiarid states of the Great Plains. Numbers of dinosaur eggs, wonderfully preserved, have been discovered in Mongolia. The dinosaurs were descendants of lizardlike reptiles, but they developed various characteristics that showed their relationship to both crocodiles and birds. Dinosauria appeared in the opening division of the Mesozoic Era (see diagram under GEOLOGY), and became extinct at the close of the era. It is estimated that they lived at least 10,000,000 years ago, before the human race appeared, and were on earth perhaps 8,000,000 years.

These animals were greatly diversified in size, form, and habit. The order is divided into two main groups, distinguished by the shape of the hip bones. To the one group belonged dinosaurs with lizardlike hip bones, and to the other those with a birdlike pelvis. These latter were vegetarians; most of the lizardlike dinosaurs were flesh-eaters. The largest dinosaurs were eighty or more feet

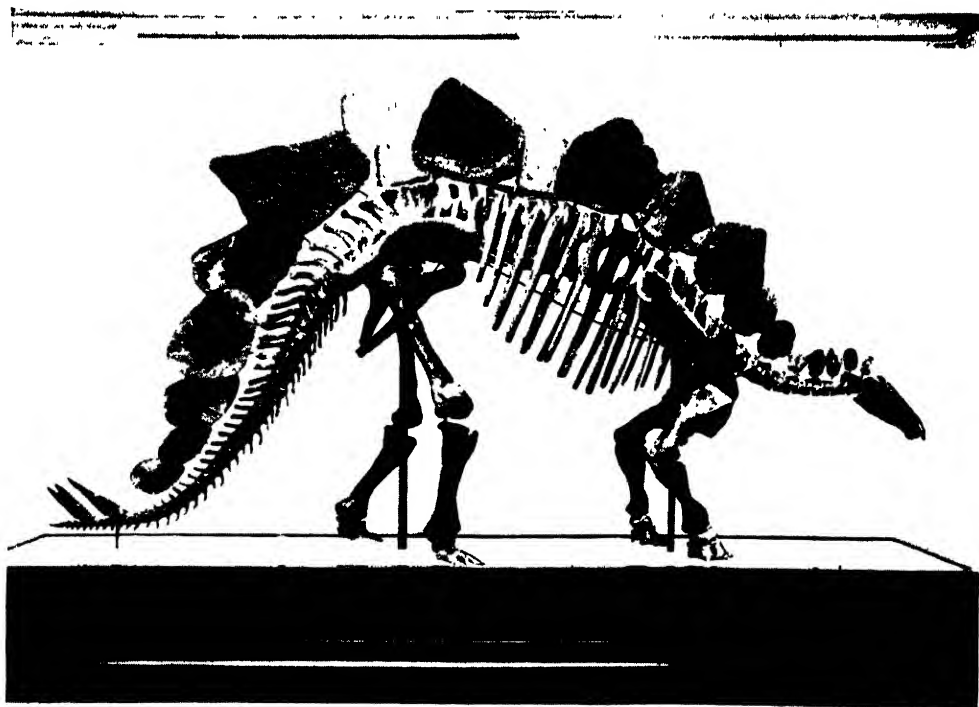
in length, the greatest land animals that have ever lived. There were smaller kinds, however, not larger than a chicken. An outstanding characteristic of the dinosaurs was the small size of the head compared with the bulk of the body. The *sauropod*, with a body sixty to eighty feet in length, weighing forty tons, had a brain weighing less than a pound.

Some of the dinosaurs walked on the two hind legs, like birds (see IGUANODON), and some were quadrupedal. The vegetarian dinosaurs were inoffensive, but the mightiest of the carnivorous reptiles were terribly ferocious. Armed with long, curved claws and daggerlike teeth, and endowed with great bodily strength, they must have been far more bloodthirsty than any creatures known to-day. Some of the dinosaurs were covered with heavy, bony plates that served as a protective armor. They all had long, tapering tails.

From fossil remains, scientists have been able to reconstruct skeletons showing what these reptiles were in life. In 1925 a remarkable moving picture showing animated reproductions of these creatures attracted widespread interest. The ingenious mechanisms graphically portrayed the appearance and habits of the dinosaurs, with scientific accuracy. See UTAH (The Land); FOSSIL. W.N.H.

[See illustrations of dinosauria, on the four pages immediately following.]

Derivation. The name *Dinosauria* is derived from the Greek for *terrible lizard*.



Photos: Metropolitan Museum of Natural History

The Stegosaurus. This monster was from twenty-five to thirty feet in length. Skeletons have been found in Colorado and Wyoming. Above, the skeleton; below, the restored figure.

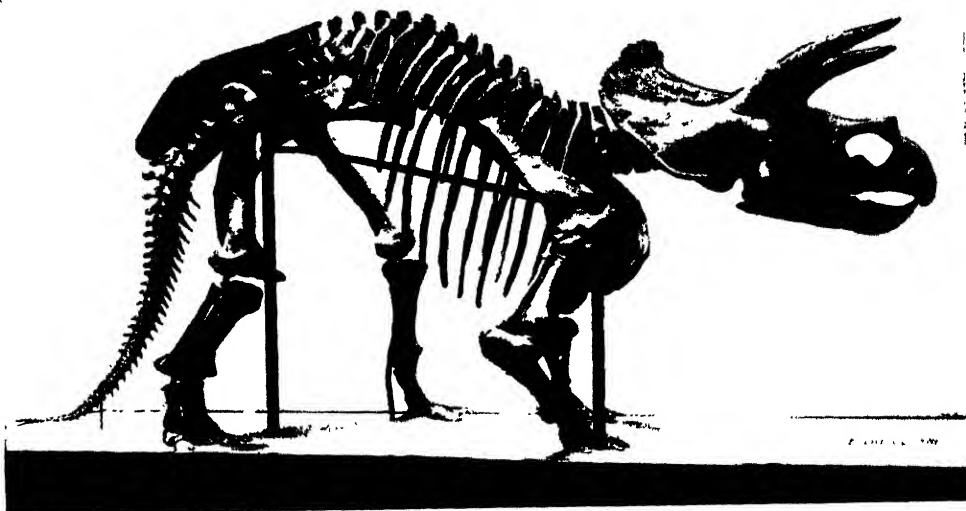
1949



Millions of Years Old. Above, in front, is the skeleton of a brontosaurus—this one in the Metropolitan Museum of Natural History, New York City; in rear, skeleton of an allosaurus, a smaller dinosaur. Below, skeleton and restoration of a stegosaurus, in the same museum.

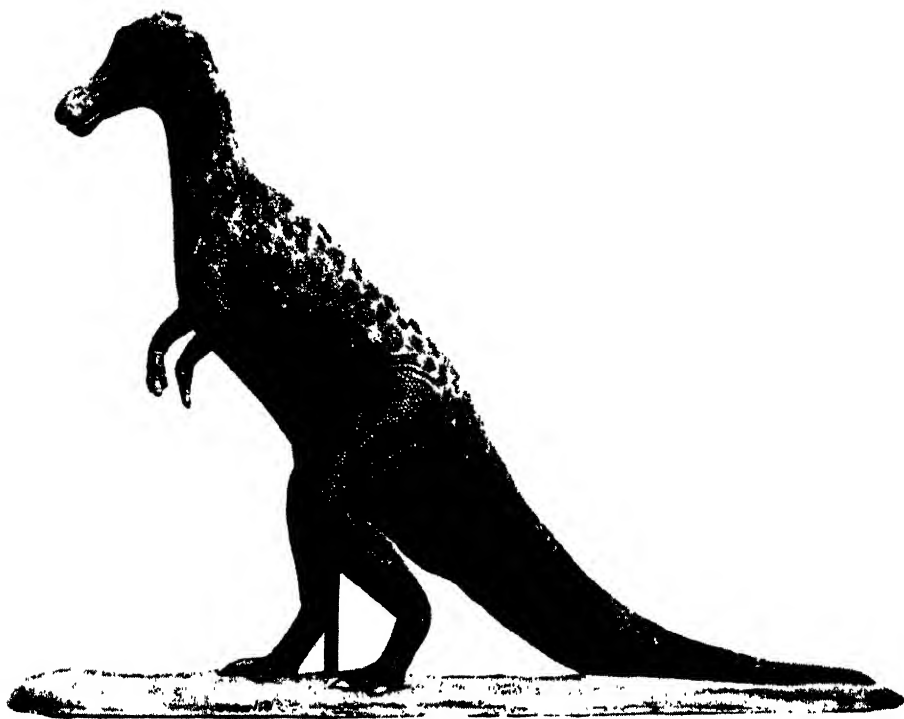
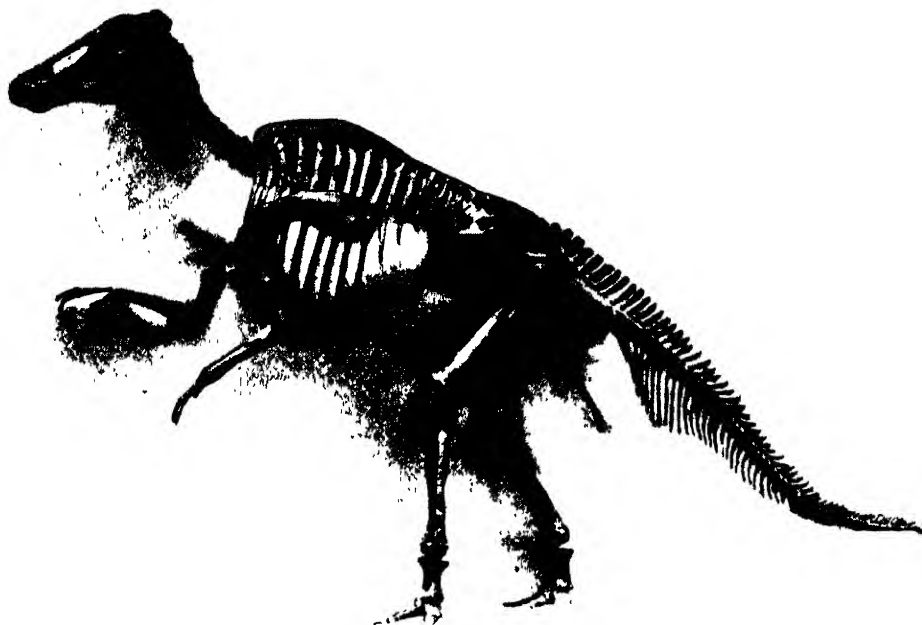
Photos: P & A; U & U

1950



Photos Metropolitan Museum of Natural History

These Were Terrifying Beasts. Figures at top and center are a skeleton and a restoration of the triceratops, a horned dinosaur. The skeleton pictured was found in Wyoming; others were unearthed in Colorado, South Dakota, and Montana. The animal was about twenty-five feet long. Below, a restored diplodocus, a reptile which was about sixty feet long and twelve feet in height.



Photos Metropolitan Museum of Natural History

The Trachodon. A skeleton and a restoration are shown. It was supposed to belong to the same family as the more modern iguanodon (which see).

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